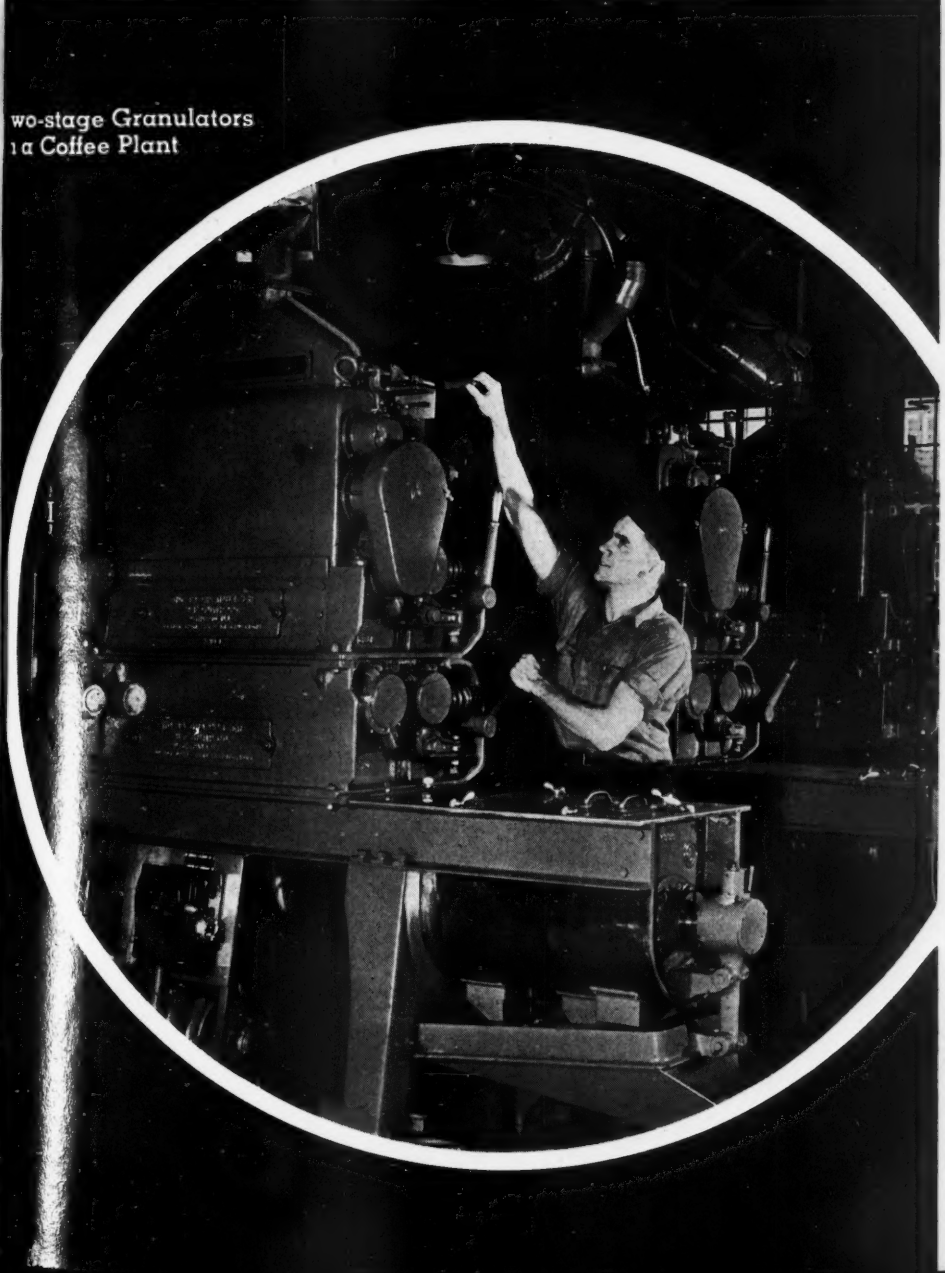
NOV 8 1944

FOOD INDUSTRIES

● FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION



wo-stage Granulators
1 a Coffee Plant

NOVEMBER 1944

The Army Food Lab In Australia

Picture of the World Food Situation

Improving Stability Of Fatty Foods

Good Cleaning Cuts Costs, Ups Quality

Wetting Agents Aid Chemical Peeling

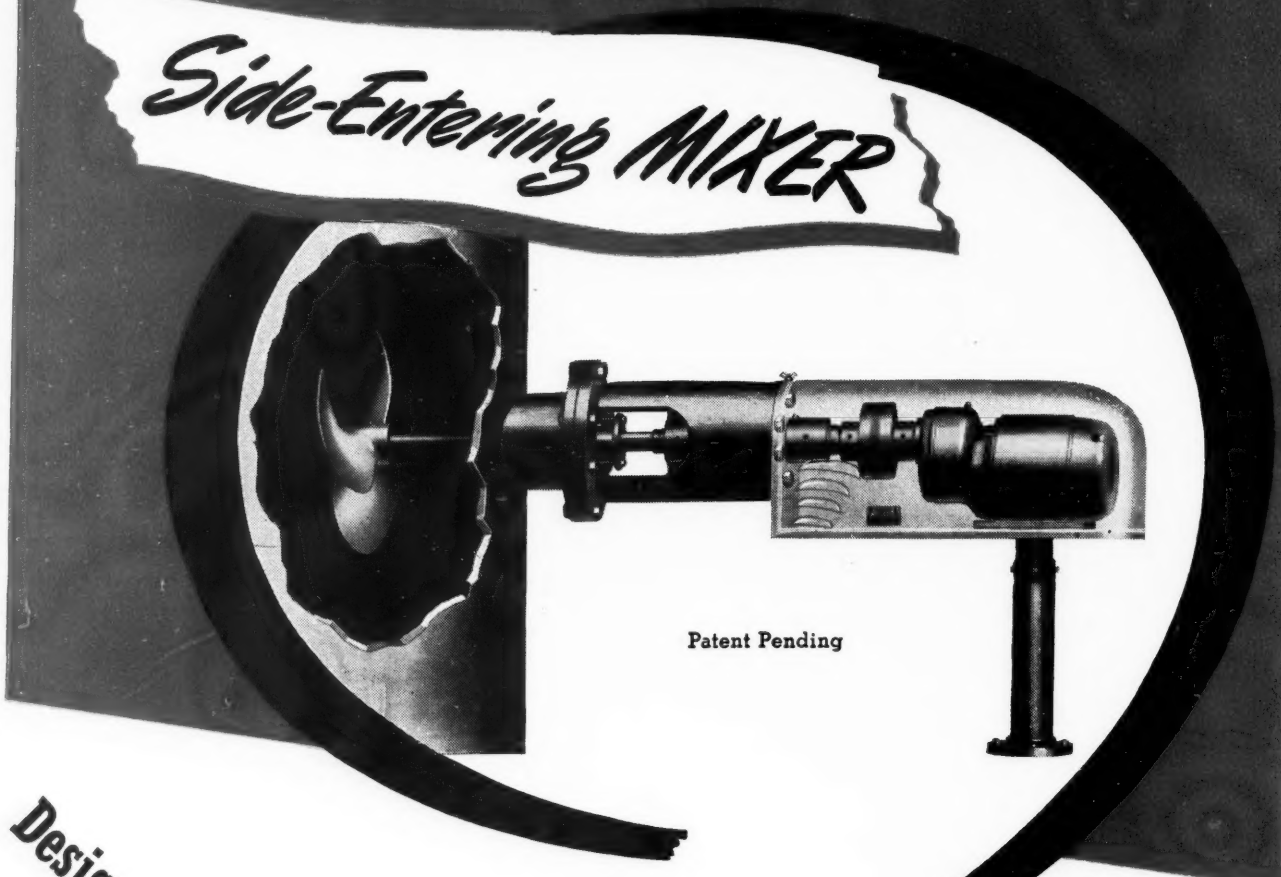
Argentine Macaroni Is Different

For Postwar—Fruit Juice as Candy

McGRAW-HILL PUBLICATION

PORTER

Side-Entering MIXER



Patent Pending

Designed to meet a troublesome problem

Here was the Problem: How to repack the stuffing box of a side-entering mixer installed in a mixing tank without the time-consuming job of interrupting the mixing operation and draining tank.

Here is How we Solved It: The Porter Side-Entering Mixer is built with an externally-accessible stuffing box. It is therefore unnecessary to send a man into the tank. An ingenious device seals the liquid in the tank while the stuffing box is repacked. Even an unskilled mechanic can do the job in a few minutes. Write for illustrated folder for complete description of the PORTER Side-Entering Mixer.

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THE COVER

Three special two stage granulators in the large modern Maxwell House coffee plant in Hoboken, N. J., are shown on the cover. Coffee feeds into these machines from floor above, passing through magnetic separators to remove any metallic objects and protect the granulators. The machines discharge to packaging machines on floor below.

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RUSSIA

Threat . . . or Promise?

WHEN this war is ended, two nations—the United States and Russia—will possess the bulk of the world's military and industrial might.

Whether this new situation will hold seeds of catastrophe or of unprecedented opportunity will be determined by policies . . . still to be formulated.

If this concentration of power leads to a bitter struggle for supremacy, then the world will be turned into a giant munitions factory.

If it is used cooperatively to maintain order, then, I believe, the stage is set for a long era of prosperity . . . and peace.

It is time that Americans, whether of the Right or the Left, face this basic issue squarely and open-mindedly.

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No group in this country has a greater stake than have business and industry in seeing that a satisfactory Russian-American understanding is reached.

Without such an understanding there can be no reasonable hope for more than a temporary and insignificant reduction of our crushing wartime tax burden. If the threat of a clash between these two giants impends, neither bankers nor governments will run the risk of lending on a scale adequate to maintain international trade at levels necessary for our future prosperity. Potential international customers, instead of buying freely in open world markets, will be forced—as during the dangerous period introduced by Hitler in the early 1930's—into the trading camp of whichever power they fear most.

If, however, Moscow and Washington will agree on cooperative plans for maintaining the peace, American business will enjoy enormous new trade opportunities after the war.

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Russia, during the three and one-half years since it was attacked by Hitler, has conclusively proved to a doubting world that it is a top-flight military power.

Soviet railroads did not break down under the strain of war.

Regions accounting for nearly 70 per cent of Stalin's key industries were engulfed by the invading Nazis, but before they fell, Soviet management engineers performed a near miracle by transplanting entire industries a thousand miles to the Urals with the loss of as little as four months' production in many cases.

Though American planes, trucks, and medical supplies have been welcomed by Moscow, fairness demands the admission that more than 98 per cent of American production has *not* gone to the Russian front.

Russian planning and *Russian* equipment won the victories of Leningrad, Stalingrad, and the Caucasus.

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But these measures of Soviet military strength—indicative as they are of an unsuspected economic development—fail to picture in adequate detail the startling potential of the Russian market after the war.

Russia, for instance, has two and one-half times the area of the United States.

It has a population of nearly 200,000,000, and this is increasing at the rate of 2,500,000 a year.

And statistics just released show that Russia has three times as many youngsters under 16 as has the United States. This is a measure both of war potential and of a vast commercial market.

And remember that in no part of the world before the war was per capita production rising as rapidly as in the Soviet Union.

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German armies occupied a region in Russia roughly equivalent to the territory in the United States north of Richmond, Virginia, and east of the Mississippi.

This huge area—with its counterparts of Pittsburgh, Buffalo, and Bridgeport; of Illinois corn fields, New York dairy farms, and Maine potato harvests—was *twice* subjected to the most withering destruction; first by the Russians themselves when they retreated before the Germans, and then by the Germans when they withdrew before the victorious Russians.

As a result, 30,000,000 people are in urgent need of complete reoutfitting. They need houses and shoe laces, trolley cars and baby carriages, tractors and livestock, hydroelectric plants and electric light bulbs.

Many of these needs will be met at home. It is doubtful, for instance, if Moscow will import cooking utensils or sewing machines, for many of Russia's huge war factories can quickly be converted to peacetime production of such consumer goods.

But for the rebuilding and expansion of her industries Russia looks to the United States for equipment.

Soviet representatives already are in this country with authority to negotiate for technical men and the equipment necessary to rebuild the great Donbas coal mines according to the most modern American methods.

It is important to remember that Russia's whole iron and steel industry, its non-ferrous mining and processing, some of its chemical production, much of its coke roasting and gas recovery, practically its entire automobile and tractor industry, and the largest of its hydroelectric plants, are based on American machinery and processes.

It is known among manufacturers that Russia recently has asked for bids on shipbuilding equipment, construction and roadbuilding machinery, alloy steels, textile machines, plastics, and a long list of rail, air, and water transport supplies.

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The Soviet Union, however, has more than a rehabilitation job on its drawing boards.

The first Five-Year Plan, which, as we all remember, was completed ahead of time in 1932, was devoted almost exclusively to heavy industry. Russia set out to build for itself the machines and the factories which, in later years, could turn out, at home, modern equipment for a vast range of light industries.

Stalin, when he inaugurated the second of his famous Five-Year Plans, promised that before it was completed Soviet factories would begin to turn out a flow of con-

sumer goods—ready-made dresses, canned foods, soap, cosmetics, shoes, kitchenware, automobiles, telephones, and modern houses.

But, by 1935, Moscow realized that Russia could not afford to enjoy such luxuries in the face of growing political tension in Europe. So, when the third Five-Year Plan was launched, there was no fanfare. Russians continued to wear their old clothes, to eat whatever simple food was available, and began grimly to build the industries which ultimately produced enough tanks, planes, and guns to turn the tide of battle at Stalingrad.

It is characteristic of Moscow that even before the last battles with the Nazis are over, Russia is planning to pick up its Five-Year Plans where the war had interrupted them.

Invitations to participate in a permanent exhibition in Moscow already have been mailed to American manufacturers. Soviet officials want their public to see samples of our new machine tools, aluminum and alloy products, oil-drilling machinery, bulldozers, and prefabricated kitchen equipment. Russia already is projecting specific plans to resume the job (1) of making the country an industrial giant comparable to the United States, and (2) of making life more pleasant for a long-suffering people.

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What is the measure of this postwar market in the Soviet Union?

Some estimates place the total quantity of goods which Russia might take from the United States during the first two or three years after the war as high as $5,000,000,000 a year. Then, as Russian industry is restored, imports from the United States might taper off perhaps to $2,000,000,000 a year.

Actually, these estimates are far too optimistic, unless the United States is prepared (1) to help Russia pay by buying vast quantities of Soviet raw materials, and (2) to provide large credits to handle the purchases during the first few years of rehabilitation.

The relations of American exporters with Russia during the period covered by the three Five-Year Plans have been eminently satisfactory. Moscow has met all of its obligations punctually; fifteen years of experience have reduced contract forms to the point where they cause a minimum of misunderstanding between the Russian representatives and the American producers; individual American companies with extensive prewar experience in handling Soviet business already are offering large credits on initial postwar orders though these may yet be replaced by large government credits at lower interest rates.

But the volume of trade with Russia after the war hinges upon Moscow's ability to pay. Never before the war did the United States buy more than $30,000,000 of goods a year from Russia. As late as 1938, Soviet exports to this country amounted to as little as $23,500,000, far less than enough to pay even the service charges on the credits which would have to be extended in connection with exports of several billion dollars a year. Only South Africa produces more new gold each year than the Soviet Union. But the United States does not want gold; more of it would only complicate the problem of controlling prices here.

If the United States, however, is to achieve, after the war, the high level of national income which is necessary (1) to keep our expanded factories in operation, and (2) to service the national debt, it might absorb from $90,000,000 to $100,000,000 a year of the kind of goods bought from Russia before the war—furs, timber, manganese, chromium, and handicrafts. But unless this volume of purchases from Russia can be boosted by another $50,000,000 annually, credits of the size necessary to fill immediate Russian needs could not be serviced without large supplemental importations of undesirable gold.

The nub of the situation is that Russia offers an extraordinary potential market particularly for our heavy industries which have grown so enormously during the war. But if this sales outlet is to materialize, then the United States must find a way to import from Russia (or from Russia's debtors if any) from ten to twenty times as much as we did before the war. Instead of merely going after the export business, American businessmen must explore with the Russians the possibility of buying bigger supplies of Soviet products.

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But more than the Russian market itself hinges upon sound cooperative action by the world's two leading military-industrial nations.

If trade between them is held to a minimum and if relations are strained, the flow of trade all over the world will be adversely affected.

Europe, long this country's biggest export outlet, certainly will never take the bold steps necessary to reconstitute its economy on a peacetime basis if Russia and the United States drift into a race for military supremacy.

The Balkan states, which may be industrialized by Moscow in order to reduce their dependence on Germany, and the Arab world with its huge need for transportation, irrigation, and sanitation, will not dare accept American credits or make big contracts with American engineers if Moscow frowns on the deals.

And refusal of Russia and the United States to work cooperatively to maintain the peace would kill, in their present embryonic stage, all dreams of a vast industrialization program for China.

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The opportunity to make a major change in the trade map of the world and at the same time to achieve a sharp rise in our own standard of living is before us.

It demands of American business leaders the kind of boldness and imagination that their predecessors displayed when they pioneered this country's unknown West.

It demands realistic action by men who know that the solution to this country's *real* foreign trade problem under today's conditions lies in boosting *imports* not exports alone . . . men who are not afraid of being paid for what they sell.

It calls for leaders who will approach Moscow and other major customers at once with constructive plans that would parallel in scope those on which this country is waging war . . . leaders who will make it clear at the outset that this bid for cooperative action emphatically demands that each nation shall have complete freedom to determine its internal political and economic organization without interference from the other.

It is *this* caliber of leadership upon which our future hinges.

President McGraw-Hill Publishing Company, Inc.

How To Prepare For Low-Cost Production

GETTING a factory ready for low-cost production is not difficult if the job is first analyzed correctly and then broken down into its component parts.

The general idea is to break down the entire operation into bits and pieces, and then to study each one separately.

A factory is nothing but a coordinated sequence of operations on certain raw materials. Usually, the coordination is better done than the performance of the several operations. Only occasionally can costs be reduced for the factory as a whole without a lot of detailed changes. Generally speaking, it's the other way around. Usually, small improvements can be discovered in a dozen or more operations. When all these are added up they amount to substantial savings.

Some changes in our thinking are likely to be necessary. Management and supervisory employees must be willing to grasp at savings that are even small fractions of a cent per unit of production.

A new word, "beneficiation," may have to be added to our vocabulary. This word means benefitting, as you would guess. But it implies still more. It involves a partial improvement of a material or operation that results in a somewhat reduced cost even though it may not be perfection itself.

By making a detailed systematic study of each and every step in the manufacturing process with an open-minded approach, the places where improvements can be made will generally reveal themselves. They will show up more quickly if accurate quantitative figures are accumulated in the various studies. Costs in dollars and cents are valuable, but cost studies measured in manhours, kilowatt-hours and B.t.u. are far more informing, as a rule.

When you reach the manhour figures for the performance of an operation, ask yourself if a 15 percent increase in wage rates for the operators on that job would up the cost to an uncomfortable extent. If the answer is "Yes," then that operation deserves improvement, for the wage increases will surely come. The very size of our national debt will insure that.

WHAT are you doing? Why? How much does it cost? These should be your guiding inquiries in the preliminary examinations of your plant. After you have the answers to these questions, the next step is obvious to any but the hidebound. The next step is an attempt to discover either a better way to do each job, or a study to see if it could be omitted altogether. It involves a receptive attitude of mind on the part of management and supervisory employees. If either group is so hidebound that it is unwilling to change or to try something new, there is no point in attempting to be a low-cost producer. If either group stands pat on the old ways of manufacturing—adheres to the traditional art—then the firm will always need very high-priced sales personnel, if it is to stay in business.

But if all concerned are earnest and receptive to change and improvement, they will want to test and experiment with new ways and new forms of equipment to see if they cost less than doing the job in the old way.

If you don't experiment, it is a foregone conclusion that you'll get nowhere. Nothing ventured—nothing gained.

Beware of letting the reactionary type of employee, usually dubbed a "square head," become too much involved in such studies or experiments. This old reliable man can be counted on to do every thing in the old way—forever. He will stand hitched. He can find 50 reasons for not improving. Listen to his criticisms and meet them. Keep him on useful work, but do not let him interfere unduly.

A final admonition will save you lots of trouble. When you discover ways by which to reduce manhour costs, it will be sound business to share the savings with the workers directly concerned—and do it voluntarily. By this enlightened policy you can create good will. Furthermore, it not only is right but is common sense to do it before a strike forces you to do it. The CIO is plenty smart. It does not call strikes before it has studied a business and ascertained that the increase is economically justifiable.

The most useful men to put on these cost-reduction analyses and experiments are industrial engineers, chemical engineers and food technologists.

The CED plan to create more jobs for workers can best be accomplished by low-cost production in all lines so that people can buy more—not less.

L. V. Burton EDITOR

The Talk of the Industry

• PRESIDENTS of five engineering societies—civil, mining, mechanical, electrical and chemical—have proposed four conditions for postwar Germany, any one of which would insure that it could never again undertake a war of aggression. These proposals would eliminate: all synthetic oil, and hold down imports of oil; 75 percent of German synthetic nitrogen plant capacity, and control imports of explosives; 50 percent of steel-making capacity in special lines; 100 percent of all aircraft plants and equipment.

These proposals would be effective just as long as the United Nations have any backbone. But we should like also to eliminate the entire German General Staff, deprive them of their estates which permit them to pursue war as a rich man's hobby; and also insure the complete elimination of all the Gestapo and all surviving Nazi party members. You will understand, of course, that the word "elimination" is a euphemism. We are not quite certain how the Russians would do it, but their method would be quite effective.

• "IF every minute counts . . . Squeeze citrus juice the night before. Store it cold and tightly covered and you lose very little Vitamin C," so says the U. S. Department of Agriculture in circular AWI-107. Mebbe so, mebbe so. But the juice will taste lousy.

Anyone who knows his orange juice will be repelled by the flavor of stale juice—even an hour after squeezing.

• WE would not want to boast about our prowess in food technology, but when the missus wailed about 50 ration points for a mere bottle of catchup and challenged us to do something about it, we got out the old slide rule and a No. 10 can of tomato puree and went to work. Result: About five pint jars of a first-class catchup as good as the "boughten" kind. Frankly, our old idea that catchup is one product that cannot be made successfully in the home has had to be abandoned.

• IN some departments of its plant, Westinghouse finds that as many as 83 percent of the jobs can be performed by disabled veterans with one eye. Eighty-two percent can be done by men who are deaf, 19 percent by one-legged men, 17 percent by men who must use a cane or crutches. If such extensive use of handicapped veterans can be made in electrical manufacturing, certainly there are many jobs for them in the food industries. It is as much the duty of management to determine what those jobs are as to bend every effort at wartime production. Industry owes these crippled service men everything—and more—that it can do for them.

• 'TIS a funny world despite its outward scowl. Take the experience of the technologist who went around telling executives that he would be happy to do a bit of consulting for them. This man spent so much time explaining what is "food technology" that he finally accepted the suggestion of a public relations expert and became a Counsellor in Food Products Development. The new title worked wonders. Very few questions were asked by the execs, and two promptly had jobs for him.

• IT is the prediction of N. E. Dodd, chief of the Agricultural Adjustment Agency, that crop production will be cut next year from the present 365 million acres to 330 million. Farmers being like rabbits, in that once you get them started on an expansion program they're hard to stop, we may see another era of paying people not to grow corn and tomatoes and little pigs.

If Congress does start such a program, we hope it will be extended to victory gardeners. Then we can make money by playing golf while the crabgrass takes charge of the pickle patch.

Hors d'Oeuvres

• Sea turtle has become a popular comestible in Costa Rica. At first the highlanders wouldn't eat it because of a rumor that turtle flesh caused leprosy. But a counter rumor that it is an aphrodisiac overcame their resistance. Which is by way of fighting fools with fire.

• *The soda pop like you guzzled as a kid on a Saturday afternoon spree is helping to win the war. The pause that refreshes lessens worker fatigue and helps keep production on schedule in war plants. Consumption, in fact, has doubled in factories since the war started.*

• Apparently OPA still will control food prices after V-E Day. The government doesn't intend to lift the lid of the Bowles anti-inflation program.

• *Coca-Cola Co. is among the companies that have written history in the production of powder and ammunition during the past 30 months. Apparently it never even stopped for "the pause that refreshes."*

• A peach defuzzer is being built by Food Machinery Corp. Now comes the trying problem of what to do with the goofer feathers tenderly plucked from the pink cheek of the peach. Maybe they could be woven into bobby socks for centipedes.

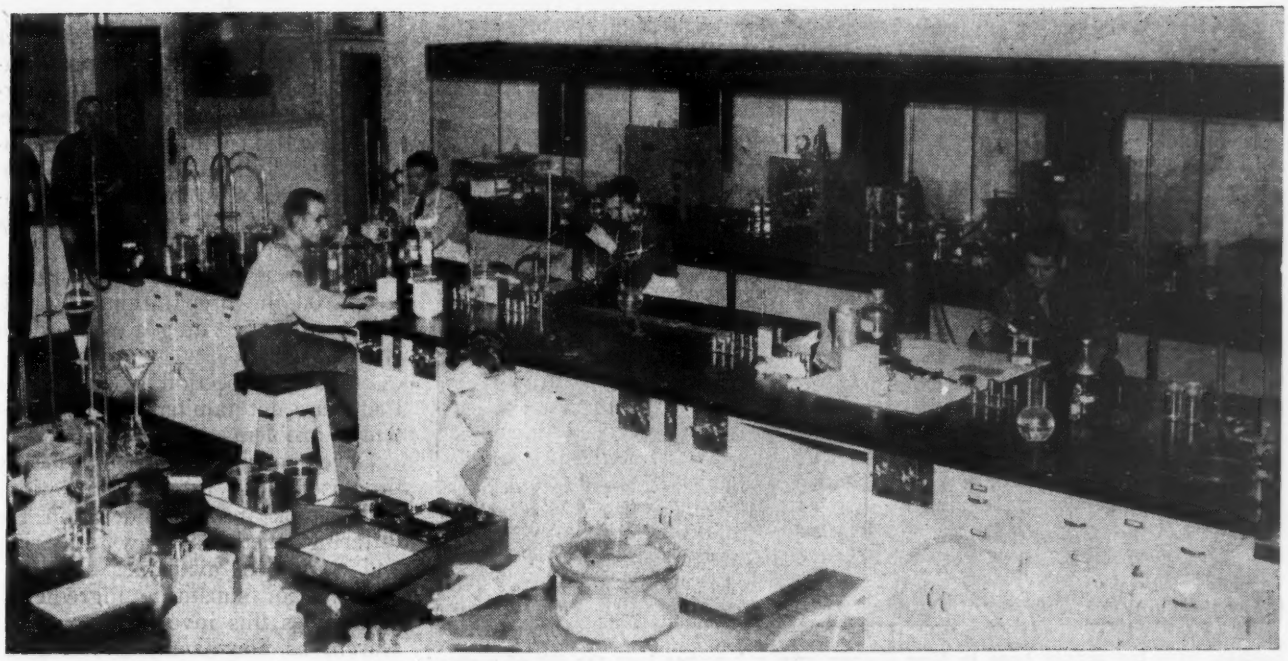
• *Peter Fox Brewing Co. owns Oklahoma oil wells which pay off $75,000 a month. Stockholders' purses are being well oiled by their beer dividends.*

• It is reported that only 2 percent of the people eat after they get into bed at night. And there goes our dream of a fortune from crackers which break into round-cornered crumbs.

• *A Gallup poll shows that 46 percent of the people think our sailors should be permitted to have beer on their ships. Another 46 percent thinks they shouldn't. Eight percent are "undecided," perhaps because they think it is none of their business. That small percentage were the only ones that are right.*

• In Normandy the Germans used beer bottles to make mines, filling them with an explosive and adding a detonator. Reminds us of home brew.

• *Purdue's tomato specialist, Roscoe Fraser, has found a practical use for that blood-red nail polish that makes the girls' hands so hideous. The thumbnails of tomato pickers are painted with the stuff to give them a color standard for the ripeness of the fruit. This bit of cosmetic engineering has wide possibilities.* F.K.L.



Main lab of the QM Subsistence Laboratory in the Southwest Pacific Area. Left to right are Maj. Carl R. Fellers, chief, Capt. Grant R. Jones, T-4 Joseph M. Pollack, Lt. Samuel Popovich, T-3 William M. Monahan (front), T-5 Romeo M. Volpe and T-5 Louis R. Parubsky. With Lt. Myron J. Powers, who has been transferred to Melbourne, these men are the original lab staff.

Army's Food Lab in Australia

The problems encountered in feeding our troops in the Southwest Pacific Area called for a control laboratory. It was not easy to find the equipment nor the personnel, but it was done. Now the Aussies come to the lab for help

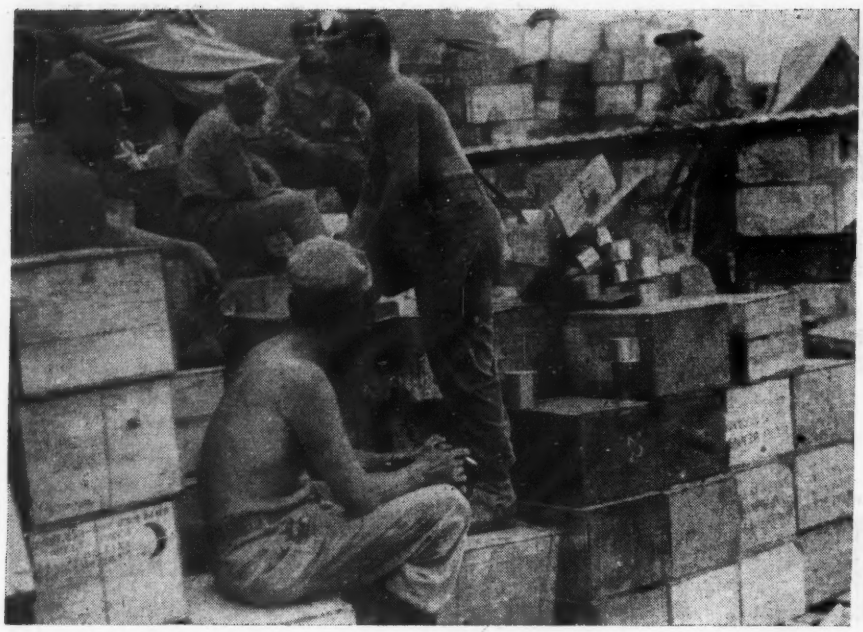
By L. V. BURTON, Editor of "Food Industries," Serving as a War Correspondent in the Southwest Pacific Area

IT took a little more than a year after Pearl Harbor for the Army to get around to setting up a food inspection laboratory in Australia. First of all, we had to send troops to Australia to help head off the Japs, and in those early days we had none too many. Secondly, the Aussie army undertook to supply our forces with their food, made under Australian Commonwealth specifications. But when our troop strength began to run into hundreds of thousands, it was necessary to introduce new foods and to modify the existing U. S. specifications for others. This, in turn, led to the need for an inspection laboratory to test the quality of the foods turned out by Australian manufacturers and to see that the specifications were met. Still more important was the job of checking up on the sterilizing processes used by Aussie canners, who had had little previous experience in making some of the foods the U. S. Army wanted. There had been some spoilage due to understerilization, in addition to the problems caused by leaky cans.

Although, in theory, the laboratory was merely for safeguarding our troops' food supply, it has turned into a consulting service for many an Australian food manufacturer. For the Aussies were quick to discover that among the laboratory personnel there were some first-rate American food technologists whose advice and suggestions were well worth while.

Use Brewery Lab

Where to put a laboratory was not the easiest problem to solve, for every place was working to the limit and laboratory equipment was chiefly obtainable from countries overseas. Luckily, Lt. Col. Robert W. Hughes (then a Major) persuaded a public-spirited owner of a large brewery to permit the American Army food technologists to share the use of a splendid large laboratory in his principal plant at a cost so low that any non-com could save the annual rent out of a month's pay. Accordingly, Major Carl R. Fellers, QMC, moved in on Feb. 1, 1943, accompanied by Captain Grant Jones (then a lieutenant) and began to make out a list of additional equipment needed. A considerable amount of the needed stuff came from what is known in Australia as distress cargo, meaning cargo from ships that were ordered on Dec. 7, 1941, to proceed to the nearest Australian ports and unload whatever



Soldiers at a big supply base in New Guinea take a breather from the job of sorting canned foods. Shrinkage of the hardwood cases in which the Aussies pack the food caused many of the cases to break open and spill their contents.

they had aboard, regardless of its original destination. Had it not been for a considerable amount of distress stuff, the Australians would have been woefully short of many supplies urgently needed later.

The Personnel Problem

The biggest problem for Col. Hugh B. Hester, in charge of Quartermaster Subsistence Procurement, however, was where to get the personnel. Food technologists are not easily picked up in the Southwest Pacific theater of operations. If the Roster of Scientific and Specialized Personnel in Washington had seen fit to include food technology in its list of specialties, the job of finding suitable men back in the States might have been made much easier. The quickest way seemed to produce our own specialists right on the job, for requests for specialists sent back home seemed to have run into snags and brass hats who took a dim view of reported needs. There was, for instance, an urgent need for closing-machine experts — men who really knew how to make an antique machine (one that might have been the last word about 25 years ago) form a perfect seam on a tin can. In this instance, the word came back that we already had *one* in Australia! Whoever made that comment failed to realize that the situation was similar to having a closing-machine man in Portland, Me., who was expected also to look after all the machines in Maryland, Florida and California.

The distances are actually comparable. But, in due time, others became available from the States. Food technologists were, however, not so easily located, especially the younger ones.

A search of the personnel records disclosed some likely prospective material, but most of the fully trained personnel had to be brought over from the U. S. and given a special course of training on the job by Major Fellers — who, as you probably recall, was professor of food technology at Massachusetts State College before he went into the Army's Chemical Warfare Service. It was, indeed, an odd situation. Young food technologists at home were seeking Army assignments and being turned down repeatedly. Yet, the entire SWPA was being combed for men of proper education that could be quickly turned into this specialty even though the men had never thought of doing it before. Well, war is like that. (Incidentally, Major Maynard A. Joslyn, professor of food technology at the University of California, was needed so much that he was flown across the Pacific in two days and spent the next discouraging week trying to find out who wanted him and what he was expected to do.)

Some of the Jobs

Growing pains of a new organization are interesting yarns for the dinner table, but space does not permit dinner chatter here. Some of the jobs of the new laboratory organization were the following:

Examination of tender samples (samples that were to be representative of tenders to the QM) to determine their suitability for purchase.

Cooperation with the food manufacturing division of the QM Subsistence Depot to bring about improvement of the quality of foods manufactured in Australia.

Instructing Australian manufacturers on the preparation of products made according to American specifications.

Sanitary inspection of local plants that were not familiar with the potential problems of botulism.

Development of foods locally processed of new specifications which took into consideration the differing methods, raw materials and equipment available.

Hunt for substitute ingredients. Sometimes this involved a physical search, as for example, trying to find four 1-gal. bottles of diacetyl — the natural flavor of butter — in a dump where the cargoes of about 30 ships had been stored. Finally, they were located in a warehouse belonging to Chemical Warfare Service but, alas, a careless truck driver broke three when delivering them.

Examination of stocks of food in subdepots to determine how long the food would last before it would deteriorate to the point of inedibility. This was very important, for in spite of all efforts at home to create packages and products that would withstand tropical conditions, many a carefully planned effort proved to have a very limited life near the equator. The Aussies have coined a phrase to describe their own efforts in this direction —"tropic proofing." In spite of the absence of a tropical laboratory, the staff has been able to follow the foodstuffs all the way to the food dumps in the combat zones to observe deterioration problems.

Branches of the laboratory have been established in several Australian cities which are handy to important sources of subsistence supply. Outside of the inspection work for the determination of suitability of tenders, the laboratory has begun to examine goods being produced for us at the point of manufacture so that any corrections in the manufacturing methods may be made promptly instead of awaiting completion and delivery of the goods.

Aussies Ask Questions

One of the unexpected and more important features of the laboratory work has been to advise Australian manufacturers on technical matters involved in the production of foods

Maj. Carl R. Fellers, who heads the QM Subsistence Laboratory in Australia.

for the U. S. forces. I happened to overhear some of the telephone conversations, and these excited my curiosity to the point that I asked for a list of some typical inquiries.

Here are some of them:

Will the U. S. Army waive specifications for (*a*) type of container and packaging? (*b*) type of adhesive, strapping, number of nails in a box or case, lacquer, enamel, net weight, drained weight, cut of vegetables, freedom from defects, etc.

How much grit is allowable in silver beet (Swiss chard in the U. S.)? How many aphids are permitted in vegetables, how much debris in jams and what amount of molds and insects in tomato products? What changes in proportions may be made in a pickle formula?

Where can machinery be obtained to do certain required jobs? How can a machine, such as a slicer or dicer, be altered to do a better job?

What constitutes a good can seam? There was so much misunderstanding about this that four full-time mechanics were required to correct container and seam faults.

What is the proper interpretation of factory laboratory findings? New chemists unfamiliar with food work desired information on what their findings meant. This was especially frequent where bacteriological and incubation tests had been made. It also came up in respect to Howard mold counts, moisture, iodine numbers on fats, vacuum, flippers, defective enamels, discolorations and off-flavors.

How do you retain the vitamin content of food products, and how can cereal products manufacturers incorporate and retain mineral and vitamin fortification?

How is pectin made and how used? There were many of these requests. No pectin is produced commercially in Australia.

Give me a list of American books and periodicals on foods and food technology. That request came up at least a hundred times.

Why is the U. S. Army so interested in having vacuum in tin cans?

Why does the U. S. Army insist upon hermetically sealed cans?

How can air be removed from dry packs of products such as coffee, fats, peanut butter, without the use of vacuum closing machines? That's a honey!

What is the proper grind for coffee?

How can the required fill-in weight be obtained?

Is a lining compound required for sealing canned coffee?

How much stearine is allowable in margarine?

What is the minimum melting point allowed for tropical fats?

How do you use Eranol (ethyl formate) to prevent insect development in dried fruits, vegetables and boxed cereals?

Is there a fire hazard when using Eranol?

How do you control weevils in all kinds of cereal products? Is vacuum fumigation effective?

What is the future of dehydration, or freezing?

What is the future of the Australian fishing industry? Why do we have to import canned fish?

Why does enamel come off cans?

What causes internal rusting?

What causes paneling, and how is it avoided?

Why is it necessary to use stainless steel table tops, pails and kettles where wooden and copper equipment always have served satisfactorily?

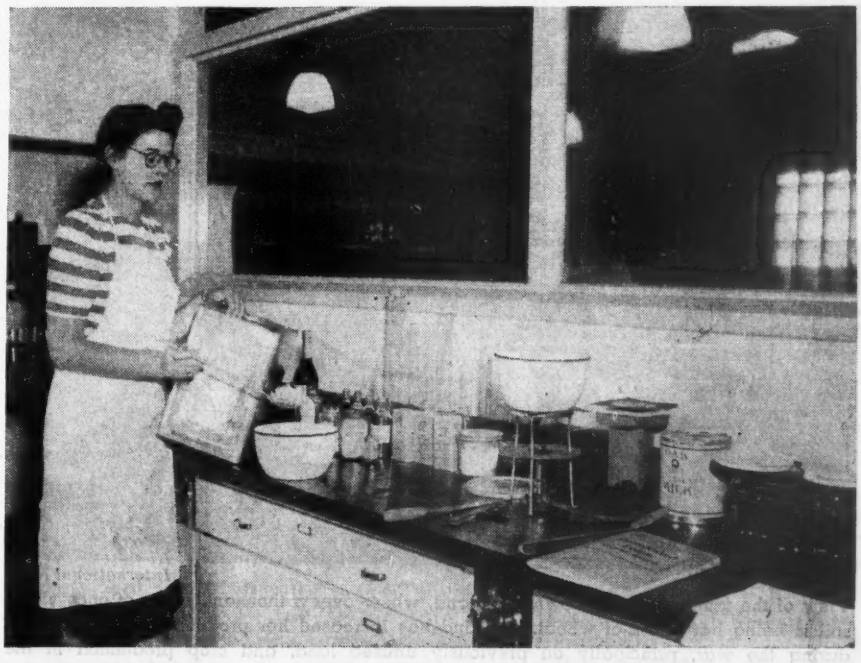
What makes flash-pasteurized citrus juice settle out? What makes canned grapefruit juice milky?

There were many requests for information on flash pasteurization.

U. S. Army assistance was requested in securing additional manpower in plants, additional plant equipment and additional laboratory equipment such as microscopes, refractometers, can openers, vacuum ovens, gages, and the like.

Everyone will recognize these as bona fide questions, many of which might be asked in many an American food plant as well. Some of them are questions that reveal the need for qualified food technologists where none have ever been employed before. The fact that the Australian manufacturer has turned to the U. S. Army for technical aid of this sort shows that, within the limits imposed by war and higher authority that does not understand food technology, we have been doing a splendid job of cooperating with them.

EDITOR'S NOTE—*This is the fourth of a series of articles, written and censored in Australia, during Larry Burton's visit to that country at the invitation of the Australian government, to help solve some of their "growing pains" in food processing, particularly canning.*



A civilian employee reconstituting dehydrated vegetables in the development laboratory.

WORLD FOOD OUTLOOK*

The facts presented here will give food processors plenty to think about and much to use in their postwar planning. Beyond the relief period, there will not be much demand for American food abroad unless prices are competitive

By KARL BRANDT, Economist,
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DURING the final phase of the war in Europe — which may extend well into 1945—and during the early relief period, the world will have an abundance of grain, but there will be a shortage of sugar and of butter. At the same time, a heavier demand for meat, bacon, dairy products and eggs—particularly on the side of Great Britain, and to a much smaller extent in Belgium, Norway, Switzerland and Greece—will create for the British Dominions and Argentina a lively market, while the United States may experience difficulties in disposing of exports of animal products outside of Army, Navy, Lend-Lease and UNRRA purchases. As the demand by the armed forces and for Lend-Lease slackens, real exports ought to begin to move.

There is no reason to anticipate very embarrassing surplus situations or acute shortages of serious proportions, provided that the proper adjustments are planned and executed in time.

In the longer run of three or four years, an extraordinary downward adjustment in the U. S. production of crops and meat is unavoidable. If export markets cannot be secured by selling at competitive prices, the domestic adjustment will assume very appalling productions.

The European Continent still has great production reserves for animal products, for which it had a small net export balance. It will tend to expand its animal production and import chiefly grain and oilseeds. With Russia remaining a self-sufficient block and the British Isles chiefly supplied by the Empire, Argentina and Uruguay, there remains for the United States not too great a foreign area for marketing animal products, unless we fight with low prices, tariff concessions and long-term foreign investments. Asia has too low a purchasing power. The reliable basis for the American meat industry is the domestic market, with its great capacity when employment is high. However, it seems a dangerous illusion to count on the 11 or 12 million men in the armed services to maintain a consumption of 365 lb. of meat a year after their return to civilian life.

Beyond the relief period we foresee hard times for American agriculture. This should be a challenge to map out a wise and strong strategy now for weathering the storm later!

International News

View of the famous Sussex Downs, England, where over a thousand acres of once virgin soil is being harvested of wheat. England has increased her production of bulky foods during the war, principally on previously unused land, and crop production in the United Kingdom will remain high for several years before it falls off.

Relief Requirements

During the relief period (one to two years after cessation of hostilities in Europe), the European nations will all be interested in maintaining or restoring their agricultural production and in purchasing certain strategic food and feed materials with the greatest possible economy. Since in Great Britain domestic production is high and great war stocks will be reduced to normal holdings during the relief period, we may expect the total demand of the British Isles and the Continent to remain considerably below the 1934-38 average, which was roughly 40 million tons of overseas shipments, especially in view of the impoverishment of Germany and Italy. If the surpluses of the Danube Basin should find their market in Russia, the market situation for overseas exporting countries would be improved, provided that the western European industrial countries manage to find foreign markets for their industrial exports of a sort that would make it possible for them to raise the necessary funds to pay for food imports. The harder they have to struggle for export outlets, the more the west-European in-

*From an address at the 39th annual meeting of American Meat Institute, Sept. 28, 1944.

dustrial countries will be obliged to boost their domestic food output and to buy supplies where the price is lowest.

It is probable that during the relief period a surplus problem will be encountered regarding many basic food commodities, while in the case of others, shortages will prevail. At the end of the European war our agriculture will produce 25 to 30 percent more food for sale and use on farms than during the average of 1935 to 39. The United States will have to face the serious problem of whether we will be able to share equally in the developing international food trade during the relief period. It will depend largely on the prices we ask for our food products abroad.

To see our own position in its proper perspective, we must realize also that even now, with food exports at their peak, American food represents only 10 percent of all the food moving across the seven seas. Nor can we afford to ignore the fact that the United Kingdom is negotiating an agreement with Argentina providing for the purchase of all Argentine animal products for a period of four years, at fixed prices for two and negotiable prices for the other two years. Similar arrangements with Canada and New Zealand are said to be under way. It would be surprising if Australia and South Africa did not reach agreements in that direction also.

If we want to sell a large volume of food, feed and fiber abroad, we must not only do so at competitive prices but must give those nations who are the potential buyers an opportunity to make payments in goods or services. In fact, if we want to contribute to a real international prosperity, we ought to consume more foreign goods and services for a good many years than we supply to other nations, because we are the world's greatest creditor nation. Otherwise, we must extend large loans to other nations on very long terms.

The period of relief will, however, still afford many unusual opportunities of supplying food for emergencies and filling gaps made by the war and the aftermath of war. But in the reconstruction period, very serious difficulties may be foreseen in the world's food market. Technological progress, largely invented and accomplished in this country, will be applied after the war here and in all the advanced export countries. New labor-saving machinery, new varieties of plants, better breeding and feeding methods in animal husbandry, more effective insecticides, cheaper nitrogen fertilizer—these are only a few of the signs of such progress. They will all tend to keep food production high and to lead to surpluses.

International News

Paris provides an example of the relief feeding problem immediately following liberation. Food lines like this bread queue were seen everywhere in the city.

Such surpluses will show up first in grain and crops in general, next in fat and finally in meat and other animal products. Lard, by the way, will be in trouble after the relief period and sink to a substantial extent into the soap kettle unless it is fully improved in quality to the level of vegetable and compound shortenings by proper processing, including hydrogenation.

Demand vs. Income

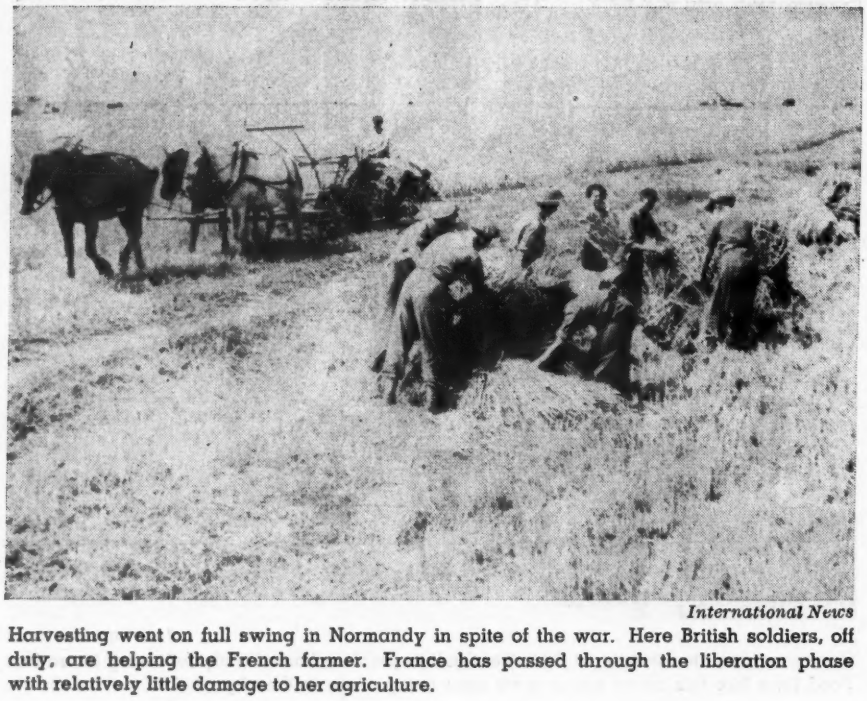
There is much discussion about the necessary improvement in the diet of the people in the world. But people as well as nations will still have to earn their food, and an improvement in diet will, by and large, be accomplished only insofar as they themselves manage to improve their economic status by becoming more productive.

Official Overoptimism

There is another important time element to be considered for the relief period. Shortages of food supplies make themselves felt mainly in the second half, and still more in the last quarter of the crop year. How great a demand for relief shipments will accrue in any one crop year will depend on the *season* in which occupation begins, and on the *aggregate territory* that will come under occupation. If the entire European continent were occupied at once by January 1, 1945, the immediate aggregate demand for relief food would necessarily be much larger than if, for instance, the last third became occupied only by midsummer 1945, the more so if that occupied portion happened to be normally the chief deficit area. A considerable part of the official overestimation of actual relief requirements over the past 18 months has its origin in overoptimism about the date of final victory.

As the European war ends, the economic unit of Fortress Europe operated under Nazi domination is being broken up. The iron curtain of the naval blockade is sinking, and the arteries of ocean-borne traffic will soon begin to pulsate once more. As before the war, sea transport will prove cheaper than railroad freight in interstate commerce on the European continent, and food will flow more easily from the United States, Canada, New Zealand or Argentina to Rotterdam and Antwerp than from Czechoslovakia or Hungary to those cities.

As long as Japanese troops are entrenched in China, Indo-China and Burma, the chief world market demand for food during the relief period will come from Great Britain and Continental European countries. Grain and flour, sugar, fats and oils, meat, cheese, canned and dried milk, eggs, some fruits, and some canned and dehydrated vegetables are the chief commodities concerned, aside from coffee, tea and cocoa demands.



International News

Harvesting went on full swing in Normandy in spite of the war. Here British soldiers, off duty, are helping the French farmer. France has passed through the liberation phase with relatively little damage to her agriculture.

War Changes Diet

After the war, all nations will try to regain their prewar dietary status. This means that they will want to consume less starchy food, more fats, more meat, eggs, cheese and milk. Although the more advanced industrial countries will tend to eat less bread, there will be a strong demand in those countries for wheat and wheat flour from overseas, because the people yearn for a bread containing less bran, and because more grain will be needed for a feeding to chickens, pigs, meat and dairy cattle and horses. The importing countries will need substantial imports of grain, chiefly in order to overcome the shortage of domestic animal products.

Continental Europe, excluding Russia, has during the past five war years reduced its herd of 95 million cattle by 7 percent, or 6 million head, its flocks of 100 million sheep by 7 percent or 7 million, or both only slightly. The hog herd of 75 million pigs was, however, cut by 30 percent and the poultry flocks of 550-600 million birds by perhaps 20 percent.

The 22 million goats and 25 million horses, asses and mules were maintained. The greatest reduction in hogs has occurred in Denmark and Holland. The herds were best preserved in the Danube Basin, particularly in Rumania.

The total Continental production of meat during the 1943-44 crop year was perhaps 25 percent lower than in the average of the five prewar years.

Milk production is probably between 10 and 20 percent below prewar output.

However, it should be carefully considered that since 1942 there has been a process of improvement in the production of livestock underway, particularly in Denmark. The Continent had two good crop years in 1942-43 and 1943-44. On the whole, Continental agriculture is much less deteriorated than has generally been expected in Allied countries.

We may expect the potential demand for meat, cheese and eggs to be heavy everywhere during the relief period, in importing and exporting countries alike, and the desire will be to convert grain and other feedstuffs into these products.

Fat, Protein Deficits

The group of commodities which will be in heaviest demand — aside from grain and flour — and which rank ahead of meat, are the fats and oils. The consumption of fats has been reduced in navy-blockaded deficit countries, and in addition, the vegetable fats carry with them the vital feed protein which is needed for stepping up the production of animal protein and animal fat. Thus in all countries with a heavy feed protein deficit, oilseeds and oilcake and meat will be as much, or more, in demand than will vegetable oils or lard. With reference to the fats, it is necessary to consider a heavy demand for soap.

Among the meats, pork will probably find a ready market on the Continent, because of its great versatility as to use and its substantial fat content. The deteriorated railroad and truck transportation systems, and the wrecked warehouses and cold storage facilities, will create a preference in the trade for canned, salted and smoked imported meat.

It will be surprising if the demand for dehydrated food survived the first stage of the relief period. Dehydrated eggs and vegetables probably will be on their way out as soon as fresh supplies become available. The demand for fluid milk, cream, butter and cheese will be lively. Canned milk should have a good export market until the dairy industries of the importing countries have fully recovered. Citrus fruit, grapes, apples, dried figs and dates, fruit pulp and nuts will find a good market in Great Britain and those Continental countries which can maintain or reestablish a sufficient consumer purchasing power.

The Stockpiles

On the supply side, some major outlines of developments are becoming perceptible, too. Since in the relief period shipping probably will be more abundant and agricultural production in the chief exporting countries will be high when the war ends in Europe, it seems safe to assume that in Great Britain as well as in the Western Hemisphere the tendency will be to dispose of a major part of the accumulated war stockpiles and the excess commercial stocks.

The exact size and the composition of these stocks, and the various claims to them, are not publicly known. James F. Byrnes, Director of War Mobilization, stated in his report to the President on Sept. 7, 1944, that the reserve stocks for the civilian population of the United Kingdom were increased from 1.5 million to 5.5 million tons. He wrote that "if after V-E Day this stock should be fixed at 3.5 million tons it would leave 2 million tons available for relief." This seems to be a very conservative appraisal, because it assumes that by V-E Day the stocks would already be decreased by 2 million tons.

The American and British armed forces probably will reduce or liquidate a large part of their accumulated stocks by using or releasing them for relief needs. If the prospective 1945 crops are satisfactory, food processors and the food trade in all exporting countries may also try to reduce their excess stocks in order to avoid losses by price decline.

In general, we can foresee that the reduction of war reserves all around will bridge a considerable part of the gap. It is even possible that in some of the reoccupied countries, and in northern Italy and in Germany, some war stocks may still be available after victory in Europe.

Mr. Byrnes' estimate that food production in Allied controlled areas except Russia is about one-third above normal seems high, but there is no disagreement that food production in areas under Allied control is substantially above the prewar average. As new farm machinery becomes more readily available and as American, Canadian, Australian and New Zealand soldiers return from the armies to the farms, agricultural production will be set for a new record. Drought and other adversities of weather may reduce the flow of crops to some extent and tighten the feed supplies. Yet there are also indications that additional sources of food may begin to flow again. During the war, Antarctic whaling has been reduced to insignificant catches. A "closed season" having been in effect for several years, the prospects for exceptionally good results for future expeditions appear bright. It is possible that by spring, 1945, 100,000 to 150,000 tons of whale oil, which is the best-known raw material for margarine, may come to market. It may reasonably be assumed, also, that the fisheries of the United Kingdom, Norway, Belgium, Holland and Denmark will begin to yield better catches. Once the Philippines, the Dutch East Indies and the South Sea are freely accessible for merchant ships, larger supplies of copra will begin to appear in the United States and Europe.

On the Continent, agricultural production will recover and begin to fill a part of the deficit, provided that after military victory in Europe peace and order are restored. If revolutions and general chaos break out, European production may reach its lowest ebb a year or two after the end of the war. One of the chief concerns of economic observers must be to register the extent and location of civil war and disorder in the many corners of Europe, because in those particular areas the greatest deficit in the world's food economy may arise.

All these expected general directions of demand and supply for major commodity groups can hardly be considered more than that. A review by countries or groups of countries will give a better idea of the prospective potential demand and the conditions peculiar to its becoming effective.

Larger Nations

In what we call the relief period, Great Britain will make available to her population much more meat, cheese, bacon, eggs and fruit, but she will also allow here important livestock industry to obtain more imported feed materials. Crop production in the United Kingdom will remain high for several years before it falls off. The necessity of enlarging the herds and flocks will for some time keep the domestic supply of meat at a low level. With reference to fats, the per-capita consumption of which has been kept relatively high, a shift to much more butter as well as some expansion in other fat-bearing commodities may be expected. Great Britain's imports may rise to 15 or 16 million tons, but not to the prewar 20, within several years because domestic production will remain high.

Potentially the second greatest demand, next to Great Britain's, might be that of Russia. If the Soviet government should decide to lift the diet of the civilian population more quickly toward its normal level than the domestic supplies permit, it is conceivable that a very large Russian demand for food would become effective in the world market. It would concern chiefly animal products, because it will take Russian livestock herds from three to five years to regain their prewar strength, which was still very small in terms of available per capita supplies of animal products. But nobody can say what Russia's policy will be.

France has passed through the phase of liberation with relatively little damage to her agriculture. The country has, if reports are correct, an excellent wheat crop. France probably will not buy a large volume of food outside her own colonial empire. Her domestic vegetable oil production has been expanded to such an extent, and she should not need to draw on the world market for fats.

The food situation in the liberated parts of Italy is critical, but principally because the Germans still hold the Po Valley, Italy's food basket. Before the war, Italy imported some 500,000 tons of grain and 150,000 tons of vegetable oils and 70,000 tons of meat; but she exported 370,000 tons of fruits, and 20,000 tons of cheese. When the terribly impoverished country begins to function as a unit once more, chiefly vegetable oils, and a small amount of grain, will be needed from overseas.

The Smaller Nations

Belgium, Switzerland, and Norway will definitely be in the market for food imports, but we must realize that these countries represent only about 16 million people. Since these countries have substantial funds for purchasing food, and

(*Turn to page* 140)

British Combine

Emergency food supplies for Paris were rushed by air from British bases to a point near the city and then moved the remainder of the distance in army trucks. Here a trailer load of flour is readied for the trip. The emergency supplies included special chocolate, dried milk, 1,500 tons of flour, 750 tons of meat and 350 tons of biscuits.

Effective Cleaning Cuts Costs And Improves Product Quality

By PERRY E. PIPER, Beatrice Creamery Co., Bloomington, Ill.

Up-to-date methods and the use of selectively chosen cleaning materials speed up cleaning operations, reduce the wear on equipment, prevent contamination of products, save manpower and build customer good will

COST STUDIES have shown that from 30 to 50 percent of the labor in a food plant is chargeable to the cleaning and sterilization of equipment. Reduction of this percentage means not only lower operating costs but release of manpower for more productive work.

The adoption of the latest cleaning methods helps greatly in reducing the very important cleaning item in the expense column of the food plant's ledger. Equally important, from many standpoints, is the care to be taken in the selection of the cleaners and cleaning supplies.

An essential consideration in cleaning equipment is the conservation of metals. Methods and materials that will not affect the metal of the plant equipment must be used. An outstanding example is found in the cleaning of milk cans. Production of these cans has been curtailed greatly by the War Production Board, and the amount of tin in the protective coating has been reduced materially. But given proper cleaning care, these "Victory" cans will give satisfactory service until a more durable can again is available.

Carefully chosen cleaners and proved methods of application also will do much to conserve the chemicals used in washing powders and cleaning agents. Many of the chemicals that heretofore have been available to food plants now are prohibited because they are employed in cleaning armor plate in ship building and molds and casts in gun plants.

Manpower—or more accurately, woman-power—utilization is a problem facing all food processors. If the plant and equipment cleaning job can be done quicker and better with proper methods and materials, the labor problem is lessened. Also, the simpler and easier the job is made, the more satisfactory use can be made of the type of help available these days—be it men or women.

The cleanliness and the degree of sterilization of the equipment also affect customer relations and sales. The obligation of any food processor is to supply his customers the highest quality and most wholesome product possible. Customer good will is built on that basis, and consumption by young and old is stimulated with confidence. Then, too, the flavor of the product is measurably affected by the degree of cleanliness of the equipment. Off flavors, high bacteria counts and spoiled products are the penalties faced by those who tend towards slipshod methods of plant sanitation.

Water Hardness

Selection of effective washing compounds is a fundamental as well as an elementary approach to minimizing the plant sanitation problem. First, and perhaps the most important, property in many parts of the country is the water-softening ability of the washing powder. Water-softening properties carry much weight because the water composition varies greatly in different parts of the country. Some plants have extremely hard water, while the water supply of other plants is very soft. In some plants, part of the water used is softened; in others, all is softened; and in still others, none of it is softened. The magnesium and calcium salts in the water constitute a major problem in most localities. When water containing them is heated, the bicarbonates are converted to carbonates which precipitate in a very fine form and settle, with a tendency, in a milk plant, to cling tightly to the sides and bottom of the milk or cream vat. These same magnesium and calcium salts will combine with the fat of the milk and produce insoluble soap deposits which may be more of a problem than the original carbonate deposit.

Addition of various cleaning compounds to the wash water results in several types of reactions. Soda ash and caustic soda form scale. Trisodium phosphate and metasilicate form a sludge.

New Softeners

A new group of polyphosphates which have promising possibilities as water softening agents have been put on the market in relatively recent months. Perhaps the most common of the group is tetrasodium pyrophosphate. This and its sister product, sodium tetraphosphate, have been used to good advantage by some washing powder manufacturers. Expectations are that in the near future, particularly after the war, much will be heard concerning these products which heretofore have been classified as byproducts and of little use to any industry. Use of these newer polyphosphates tends to keep the magnesium and calcium salts in a nonactive solution. This "holding-up" of the water-hardening salts is a very important characteristic of a good washing compound because it permits a more efficient usage of the cleaning properties of the chemicals.

At ordinary temperatures up to 140 deg. F., the addition of sodium tetraphosphate or tetrasodium pyrophosphate will soften water without visible precipitate. In general, the acid phosphates (those that are high in P_2O_5) are more effective in sequestering and preventing the formation of calcium salt precipiates than are the alkaline phosphates. The alkaline group has been found to be more effective, however, in use against the magnesium salts.

Almost without exception, the total hardness of water has been found to be divided into two parts calcium and one part magnesium when tested for soap hardness. So in devising a washing compound, it is necessary to take this relationship into consideration.

One product, a form of sodium tetraphosphate ($Na_6P_4O_{13}$) that has been developed on a commercial scale and is known as "Quodrofos," will effectively take care of both salts with excellent effectiveness.

Another characteristic of the polyphosphate group is its ability to remove previously formed deposits of carbonates and silicates. This property is of great merit, especially in conditions where the use of drastic and violent measures with acids and other lime solvents is impractical or impossible. The use of these products in the soaker-type bottle washer will aid greatly in the elimination of lime deposits and the prevention of their formation.

In this connection, mention should be made that these products are quite effective as deflocculating agents in the free rinsing of washing compounds. Up to 10 percent of polyphosphate is recommended for use in the washing powder to prevent the formation of the scum and curd deposit so often left on the equipment as a result of the precipitation formed by the action of alkali on the salts in the water and in the food product that was processed in the equipment.

Wetting Ability

The second characteristic of a good washing powder is that it must have high wetting ability or possess the ability to remove the surface film that occurs on all surfaces when the film becomes wet. This is, in reality, the reduction of the surface tension. This property is particularly important in washing powders. A powder that will wet the surface and also wet the film will help the solution to get under the film, or dirt, and loosen it from the surface so that it can be washed away. Much has been said and written about wetting agents.

A washing solution may have the power to dissolve protein such as casein and the power to emulsify fat, yet it may lack the ability to penetrate into the dirt and get next to the surface to be cleaned. This ability to thoroughly contact the surface is called "wetting ability." Before any cleaning solution can attack the greasy, fatty film left on equipment it must penetrate this more or less waterproof layer of contamination. A great deal of brushing with old-time cleaners is required to penetrate this film of "dirt" mechanically. Modern cleaners, which have wetting ability, will do this by contact alone.

There are many wetting agents on the market. Most of them have been restricted for the present because of use in war industries. But at the rate required to do a satisfactory job, there is still a sufficient supply of these products to do much good and be of great help to production departments in the food processing industry. Some chemicals have a degree of wetting ability in themselves, but most of them require the assistance of a wetting agent to do an efficient job of cleaning. The more common of the wetting agents—products that put "head" on washing solutions without using soap—are sulphonated alcohol and acid salts of polyalkylene polyamine.

Many authorities expect that after the war the newer developments in cleaning technics and compounds will be centered around wetting agents. This expectation, coupled with the natural high germicidal and detergent ability of the compounds, has much evidence to support it.

Water in itself is a very poor "wetter" because its surface tension is nearly twice as high as that of any other liquid. This surface tension is so great that many aquatic insects

The four milk bottles in the top row are covered with scale because of the use of an unsuitable washing compound. Those in the middle row are from the same lot of bottles and have been washed 64 times with a proper compound. The bottles at the bottom are new ones washed 64 times with the compound used on those in the middle row, showing how lime can be removed and how its formation can be inhibited by use of a properly balanced cleaning compound.

and some birds, especially those of the Hydrobates family, make use of water as a natural skating rink or a surface on which to stand. It can be, and is, decreased by the addition of soap to permit stretching of a water film to form a bubble.

The addition of less than 1 per cent of dioctyl sodium sulphsuccinate, a common wetting agent known as "Aeresol," will lower the surface tension from 72 dynes per centimeter to less than half of that value. A piece of highly twisted yarn when placed in a glass of water will hardly wet through in one hour. But in water to which a minute quantity of wetting agent has been added, it wets in less than a second and quickly untwists and sinks. These wetting agents are of great value to the textile trade, as they hasten the penetration of dye into the fabric. The dentist uses them in the treatment of root channel disorders, as the "wetted" solution will quickly penetrate the small capillary opening in the nerve and tooth channels. In the food processing industry, the use of these wetting agents greatly aids the cleaning job by getting under the protein and fat films and hastening their removal.

Emulsifying Power

Emulsifying ability of a powder to attack the fat is a very important factor in the cleaning of equipment. The greasy, fatty film that is left on equipment will be removed more easily if it can be emulsified. That is, if this film can be separated into smaller particles and each particle surrounded with a layer of solution it will be carried away with the rinse water. In connection with this wetting, there also is a certain degree of saponification of the fat in which the fatty materials and oily materials are broken down and converted into soap or soap-like products, and which must be mixed with the alkali of the washing powder to be carried away with the rinse water.

Free Rinsing Important

From the foregoing statements based on plant practices, one can easily see that much of the efficiency of the cleanup and washup job depends upon the rinsing of the equipment. For that reason, free rinsing is a very important characteristic of a good washing powder. The loss of luster on stainless steel and, to a great extent, the formation of milkstone in dairy plants are attributable to the failure of the operator to do a good job of rinsing. This poor performance may not be his fault, but in any case the failure to rinse well, to remove the products of the washing process, will result in an unclean piece of equipment. The dirt may be visible and relatively harmless or it may be invisible and a contamination in which millions of bacteria are harbored. This free-rinsing problem has been the primary factor in the development of modified alkalis. Free caustic, which really aids the washing operation, will not rinse well. Consequently, it must be supplemented and modified by another chemical.

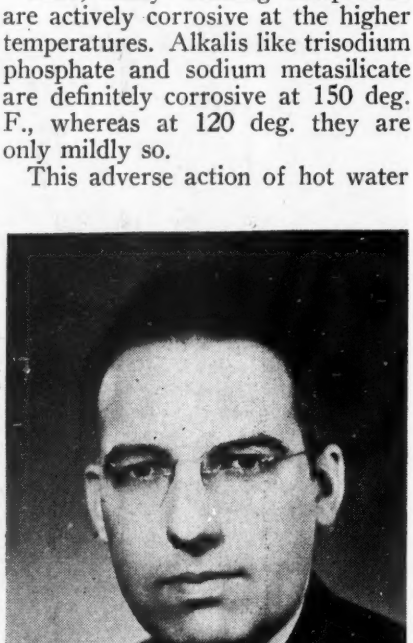
Water Temperature

All in all, the secret of good and efficient cleaning of dairy and other similar food processing equipment depends not only upon the operator knowing the correct method, but also upon the proper amount of the proper kind of powder and the proper amount of water at the proper temperature he must use.

Contrary to general practice, a temperature of 110 to 120 deg. F. is best suited to the dairy cleanup chore. This is about as hot as can be comfortably tolerated by the hand. When 145 deg. F. or hotter water is used, the emulsion of fat particles is broken and the fat oils off, the curd particles are liberated and settle to the bottom of the vat, and milkstone is readily formed.

Also, many washing compounds are actively corrosive at the higher temperatures. Alkalis like trisodium phosphate and sodium metasilicate are definitely corrosive at 150 deg. F., whereas at 120 deg. they are only mildly so.

This adverse action of hot water does not mean that hot water should not be used to rinse the equipment. The hotter the water used as a rinse the faster the surface will dry and the more completely the surplus cleaner is removed.



PERRY E. PIPER

Amount of Cleaner

In deciding upon a "proper amount" of cleaner, we suggest that the proper amount be determined for a definite quantity of water and that the amount for the given quantity of water be weighed into individual paper bags. An example might be that the contents of one bag in 100 gal. water at 115 deg. F. makes a "proper" solution. That the material is completely dissolved is also very important because serious harm may result from highly concentrated clumps left lying on a tinned surface.

An Important Job

From the standpoint of cleanliness, sanitation and equipment performance, there is ample evidence that much thought must be given to this problem of equipment cleaning in food plants. We must discard the idea that the job is the most menial one in the plant and one on which new or inexperienced employees can be placed until a better job is found for them. In nearly every plant there is much room for improvement in the cleaning methods and especially in the methods of teaching proper ways to clean all equipment.

Since great care should be given to the selection of the cleaning chemicals, we strongly urge that the experience and knowledge of the manufacturers' service men be taken advantage of in this connection. Also we urge that plant operators keep their eyes on the development of the newer wetting agents, as they may be the preferred cleaning and sterilizing agents of the postwar era.

Judicious selection of cleaning materials, however, is not enough. Proper care in the selection of the cleanup personnel and definite instructions as to the methods to follow also will help pay large dividends to the plant manager who takes the time to give some real constructive thought to his own plant cleaning problems.

Present wartime conditions, moreover, demand a maximum efficiency in the utilization of manpower so that all possible working units can be directed toward the main job, which in this case is, after all, the production of urgently needed food and food products.

Idea for Postwar—Fruit Juice In Candy Form

Concentrated juice in hard tablet form may open new market for a product of which there is certain to be a postwar surplus. As candy, fruit juice will offer many real advantages in nutrition and flavor

By LAURENCE P. GEER, Chief Chemist, Prime Products, Inc., Tampa, Fla.

Orange juice tablets packaged for domestic distribution.

TREMENDOUS expansion in citrus concentrating facilities during the past year will present a serious problem for the industry after the close of the war. While there undoubtedly will be an enlarged demand for concentrated juices, it is undeniable that new markets and products must be created if virtual disaster is to be prevented.

In considering the postwar possibilities for concentrated juices, several methods for appealing to the consumer come to mind. First, of course, there is the familiar method of reconstituting the concentrate and using it as a beverage, either directly or as a base for "ades" and carbonated beverages. These outlets have already been exploited and, while there doubtless exists a possibility for expansion in these fields, the prewar concentrating-plant capacity could probably have taken care of any increased production necessary.

Another method for presenting concentrated juice, which apparently up to the present time has been completely overlooked, is to consider the concentrate itself as an entity, a substance in its own right. With this conception, additional fields may be opened and wholly new markets created. For instance, it was discovered in the author's laboratory that it is possible to evaporate water from juices down to 2 percent moisture content, and when this is done a hard candy-like substance results.

The process depends on removal or degrading of the pectin by the use of an enzyme. Under appropriate conditions of temperature and pH, it is possible to degrade the pectin sufficiently in ten minutes. Since no precipitate is formed, no filtration is necessary, and it is often possible to add the pectin enzyme directly to the juice in the evaporator. Thus no extra step is involved over the usual procedure for concentrating juices.

If highly acid juices are allowed to evaporate without further treatment, the product may be disagreeably acid to the taste. For this reason it is expedient to reduce the acidity either by adding a solid diluent or by neutralizing a part of the acid. The exact amount of acid to leave unneutralized varies with the kind of juice. Orange juice, for example, becomes palatable with about 3 to 3.5 percent acid in the final product (expressed as grams of anhydrous citric acid per 100 g. of juice solids). This is a considerably higher total acid than is customary in hard-candy manufacture, but due to the buffering action of the substances present in the orange juice, the pH remains around 3.9 to 4.0. The total acidity of the product without adjustment of the acid will range between 6 and 8 percent, depending upon the original acidity, as well as upon the amount of dissolved solids in the juice. The pH of fresh orange juice in Florida varies between about 3.1 and 3.6. Thus neutralization of a considerable portion of the acid naturally present has a relatively small effect upon the pH of the final product.

Almost any nontoxic alkali can be used for neutralizing, but it has been found advantageous to use sodium hydroxide. This is readily available in quantity and in a high degree of commercial purity. Its salt with citric acid is soluble and filtering is avoided. It is nontoxic in the concentrations encountered.

Since pH of the material remains low, no disastrous effects upon vitamin C have been encountered.

Although the material is hard and brittle after the moisture has been removed, it is plastic while hot. Candymakers' vacuum kettles are well suited for final evaporation and it has been found advantageous for the juice concentrating plant to bring the concentrate down to about 80 deg. Brix, draw it off into barrels, and ship it to a candy factory or other plant having suitable equipment, for the finishing and packaging processes. After demethoxylation of the pectin, concentrates at 80 deg. Brix are free flowing and easily handled.

It has been mentioned that the ascorbic acid content originally present in the juice remains unchanged by the addition of NaOH, and shelf life tests indicate very little loss of this vitamin after the material has been made into hard tablets. Preliminary results indicate that fortification with vitamin B_1 and vitamin B_2 is entirely feasible.

Successful hard tablets of concentrated juice, patent for which is now pending, also have been made from grapefruit, pineapple, carrot, prune, apple, apricot, raspberry and other fruits and various combinations of two or more juices. New candy markets may be opened, postwar, by the assured surplus of these tablets.

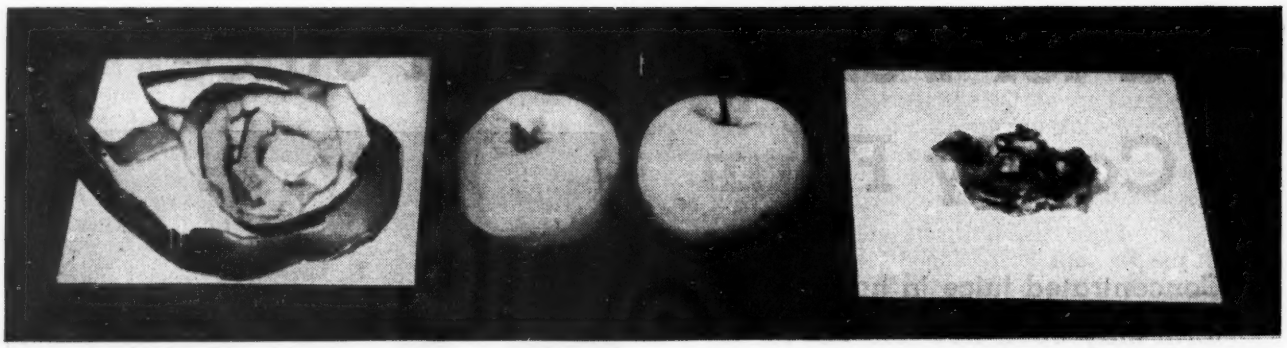


FIG. 1. The apple on the left was peeled manually in as sparing a manner as possible. The peeling beside it represents 10 percent of its weight. The apple on the right was peeled with 10 percent lye and 0.5 percent alkyl aryl sulphonate at 160 deg. F. Note the smooth appearance of this apple and the small amount of peel beside it. This "chemical" peel represents only 4 percent of the weight of the apple; 60 percent of the edible material is saved which is normally lost in manual or mechanical peeling processes.

How Wetting Agent Improves The Chemical Peeling Process

By J. G. LANKLER and O. M. MORGAN, New Products Division,
National Aniline Division of Allied Chemical and Dye Corp., Buffalo, N. Y.

Peeling time of fruits and root vegetables reduced by addition of alkyl aryl sulphonate to lye solution. This permits increased production at the same temperature, or allows lower temperature or lower caustic concentration

CHEMICAL peeling has been practiced for quite some time, but only recently through Olsen's[6] work on peaches has attention been drawn to the use of wetting agents in chemical peeling systems. He reported as much as 65 percent reduction in the time required to peel peaches when specific alkyl aryl sulphonates were added to lye solutions. This time reduction is of considerable importance, since *successful chemical peeling depends upon the ability of the agent to attack the skin before the temperature at which it is used cooks the outer layer of flesh.* Olsen found alkalis to be approximately twice as rapid as acids in the peeling of peaches. Prior to Olsen's work, a patent had been issued to Thomson[8] which disclosed the use of a lye bath for disintegrating the skin of certain fruits. Dunkley[2] patented a caustic alkali spray procedure, and Taylor[7] used a boiling aqueous solution of sodium chloride and sodium bicarbonate for the removal of potato and other root vegetable skins. Moseburg and Nehring[4] reveal a unique method for the chemical peeling of transported fruit which employs a brief contact with concentrated sulphuric acid prior to shipment. Light rubbing with water will then remove the peel.

Lye peeling has become an established procedure in the food preservation industries. Woodruff[9] described the skinning of peaches by immersion in 10 percent lye solution for 3 to 5 minutes at 140 deg. F. The peel was then rubbed off, the fruit washed in cold running water, after which it was passed through a solution of 2 percent citric or 0.1 percent hydrochloric acid. The latter step brings the fruit back to its normal pH value and prevents the usual alkali discoloration.

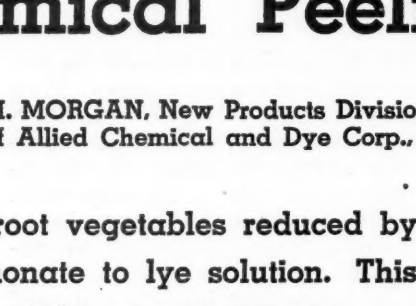


FIG. 3. Effect of alkyl aryl sulphonate on the acid peeling of peaches (10 percent hydrochloric acid; 10 percent hydrochloric acid + 0.5 percent A.A.S., broken line).

For very rapid lye peeling and with particular reference to potatoes, Mazzola[5] advocates lye concentrations up to 53 percent and temperatures up to 300 deg. F.

Reports from high-production-rate food dehydrating plants testify as to the efficacy of peeling in chemical solutions. Where carrots are processed at the rate of 350 tons in 24 hours[3], peeling is effected in 5 percent lye in 2⅔ minutes at 212 deg. F. and the skins removed by means of high-pressure rotary-spray washers. A western plant[1] which dehydrates 750,000 lb. of potatoes daily employs lye peeling to effect a saving of 50 to 66 percent in the amount of edible product lost.

The present study was undertaken to expand Olsen's work with respect to the action of the long-chain alkyl aryl sulphonate, Nacconol NR, on the alkaline and acid peeling of fruit

other than peaches and on a number of common root vegetables.

Since the required rate of production plays such a large part in the selection of peeling conditions, the present fruits and vegetables were studied over a comparatively wide range of lye concentrations, temperatures and consequent immersion times.

Experimental Procedure*

Peeling experiments were conducted with 1 liter of test solution in a 2-liter nickel beaker. A nickel mesh basket with a simple top latch served a dual purpose of keeping the specimen submerged and of facilitating the handling of the test piece in the peeling solution. Fruit was selected for uniformity of ripeness, since this factor has an important bearing on peeling time. Green fruit can be peeled if either the immersion time is extended, the lye concentration increased or the temperature raised.

The skin was rubbed off by hand under cold running water and peeling time was taken as the length of time necessary to *just* effect easy skin removal. Longer than minimum peeling times obscured the results of the experiment.

For the purpose of studying the effect of time and temperature, a concentration of 10 percent was selected for lye and hydrochloric acid, respectively, the latter based on 100 percent acid (Figs. 2 and 3). Lye concentrations up to 50 percent were used when studying peeling times at the boil for pears, peaches, potatoes and carrots (Figs. 4 and 6) and up to 20 percent lye when studying beets, turnips, parsnips and celery root (Fig. 5). The alkyl aryl sulphonate concentration was set at 0.5 percent.

The time-lye concentration relationship was observed at boiling temperatures (Figs. 4 and 6).

Experimental Results

Fruit Peeling—Increased temperatures allow shorter times of immersion in the peeling bath containing alkyl aryl sulphonate and lye or acid (Figs. 2 and 3).

Percentage reductions in immersion times by 0.5 percent Nacconol NR in chemical peeling solutions for fruit at various temperatures are given in Table I.

Peaches—Table I shows that the boosting power of the alkyl aryl sulphonate in lye peeling solutions is much more pronounced in the case of peaches where the action of the wetting agent is of greater help because of the nature of the peach skin. It is also apparent that peaches were more quickly peeled than any of the other fruits studied. For this reason, high lye concentrations need not be employed in the processing of this fruit unless it is desirable to reduce immersion time to 60 seconds or less.

Pears—The degree of ripeness

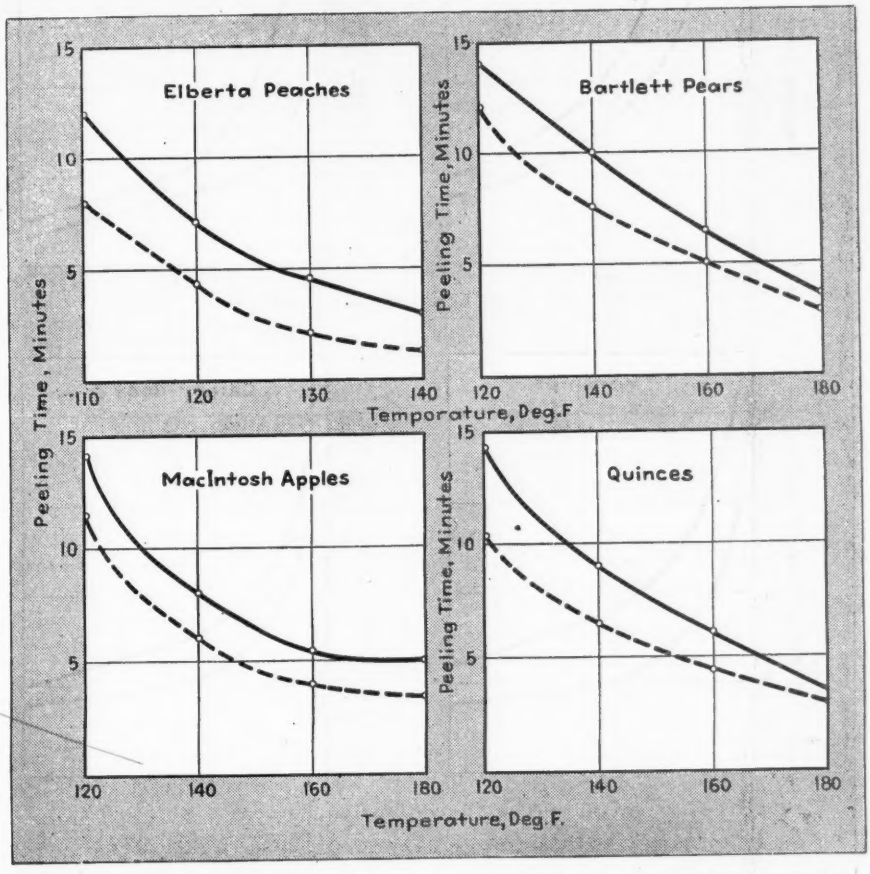


FIG. 2. Effect of alkyl aryl sulphonate on peeling time of fruit (10 percent lye; 10 percent lye + 0.5 percent A.A.S., broken line).

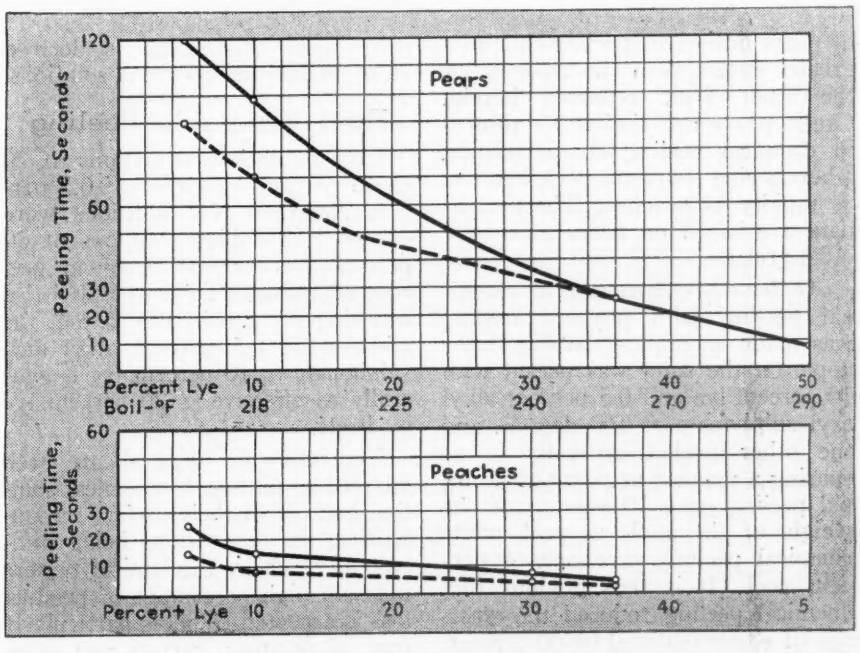


FIG. 4. Effect of alkyl aryl sulphonate on peeling time of pears and peaches (lye; lye + 0.5 percent A.A.S., broken line).

*In all the tests reported in this article in which alkyl aryl sulphonate (A.A.S.) is used, the data are for Naccanol NR, the trademarked A.A.S. of the National Aniline Division of Allied Chemical & Dye Corp.

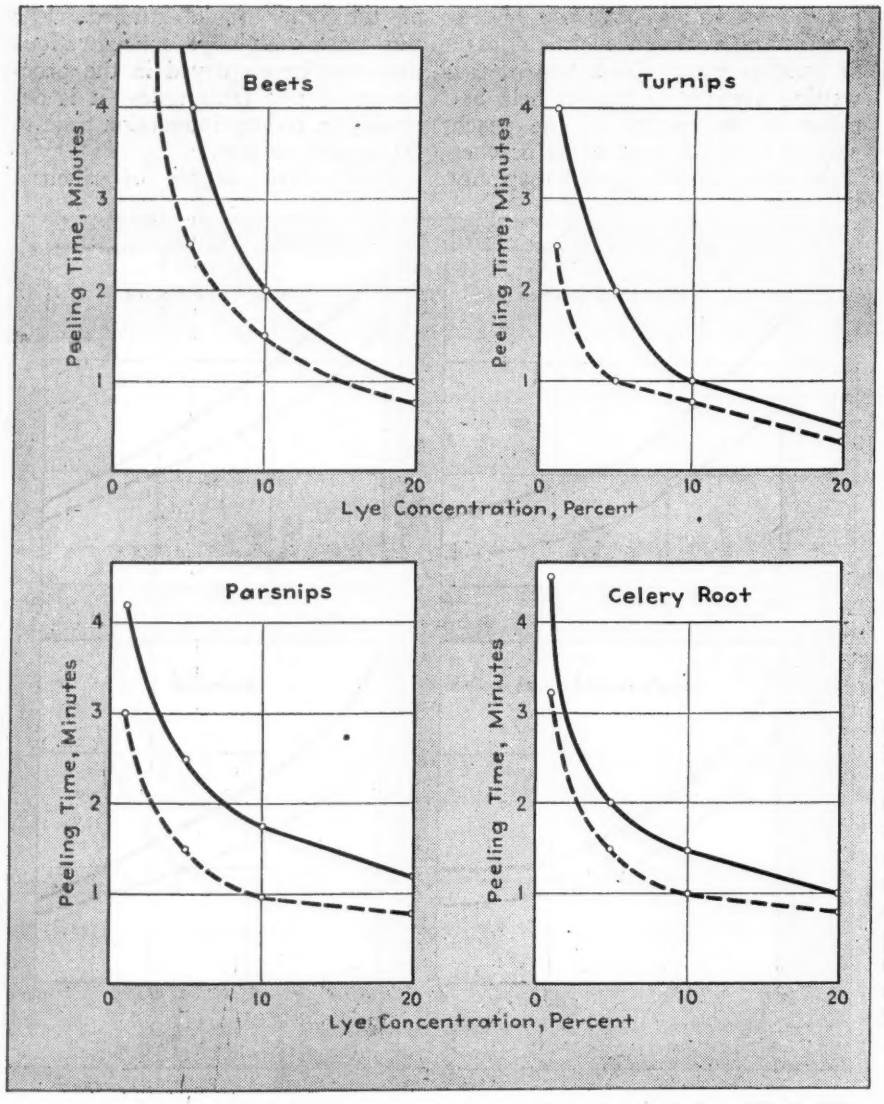


FIG. 5. Effect of alkyl aryl sulphonate on peeling time of beets, turnips, parsnips and celery root (lye; lye + A.A.S., broken line).

of pears influences peeling time to a greater extent than the ripeness of the other fruit reported herein. Green pears are similar to quinces in chemical peeling characteristics, whereas ripe pears are peeled almost as rapidly as peaches. The present data are based on pears that were quite green.

Apples—A comparison of chemical peeling with physical peeling was made on apples. In Fig. 1 the apple on the right was peeled with 10 percent lye and 0.5 percent alkyl aryl sulphonate at 160 deg. F. and the other peeled manually in as sparing a manner as possible. Manual peeling gave 10 percent of the weight of the apple as peel, while chemical peeling gave only 4 percent peel. It is thus obvious that chemical peeling reduced the wastage of edible material by 60 percent.

Quinces—Since quinces are peeled manually only with extreme difficulty, great advantage is derived from peeling in chemical solutions.

Root Vegetable Peeling

Immersion-time reductions of 20 to 40 percent by virtue of 0.5 percent Nacconol NR additions were observed in boiling solutions of 30 percent lye, or less, used to peel root vegetables (Table II). It is interesting to note in Fig. 5 that the addition of 0.5 percent alkyl aryl sulphonate to 10 percent lye is generally as effective as 20 percent lye by itself.

Vegetables in general are well adapted to peeling in chemical solution because of their surface irregularities, the depressions being difficult to reach by mechanical peelers unless a high percentage of product loss is accepted. This is particularly true of potatoes, carrots and parsnips.

A variation of the commonly used abrasive peeler would be made possible by the use of chemical peeling solutions for vegetables Softening of the peel reduces processing time in the mechanical peeler, with consequent saving of edible portions. A peeler for use in conjunction with chemical solutions is visualized as being lined with brushes rather than abrasive material to minimize wastage and effectively remove the skin from depressions in the vegetable surface.

Parsnips and Turnips—These two root vegetables were peeled more rapidly in lye concentrations of 2 to 20 percent than the others studied, the immersion times varying between 0.35 and 4.25 minutes. A time reduction of approximately 40 percent resulted from the addition of 0.5 percent alkyl aryl sulphonate (Table II).

Potatoes and Carrots—It is apparent from Fig. 6 that potatoes require substantially longer immersion times than carrots and that to peel potatoes in less than 10 seconds, a boiling solution of 50 percent lye must be used. The lye concentration, however, can be reduced to 30 percent to peel potatoes in 30 seconds (Table II). This is in accord with Mazzola's[5] findings. If peeling times of longer than 30 seconds are acceptable, lower lye concentration can be effected through the use of alkyl aryl sulphonate.

Discussion of Results

It would seem to be in the interest of the processor to work with a minimum lye concentration and temperature compatible with the production rate required, since lower lye concentrations and correspondingly lower temperatures are a less employee hazard. Special equipment is required for operation under these conditions to insure adequate control of the short time cycle involved.

The advantage gained from the addition of alkyl aryl sulphonate diminishes with increasing lye concentrations. When a 36 percent lye concentration is reached, the apparent advantage from the alkyl aryl sulphonate disappears when judged by laboratory methods of testing.

The use of alkyl aryl sulphonates in conjunction with lye concentrations of 36 percent or less for the peeling of fruit and vegetables effected the following advantages:

1. Reductions in immersion time.
2. Reduced processing temperatures when immersion time and concentrations were kept constant.

TABLE I—Effect of Alkyl Aryl Sulphonate (A.A.S.) on Peeling Time of Fruit.

Temperature deg. F.....	110	120	130	140	160	180	218
				Peeling time, minutes			
Elberta peaches							
10% lye	12.0	7.0	4.5	3.0	...	...	0.25
10% lye + 0.5% A.A.S.....	8.0	4.5	2.0	1.2	...	...	0.13
Percentage time reduction.	33.3	35.7	55.5	60.0	...	...	48.0
Elberta peaches							
10% HCl	15.0	9.0	7.0	5.0	...	...	1.6
10% HCl + 0.5% A.A.S....	11.0	5.7	4.0	3.0	...	...	1.6
Percentage time reduction.	26.6	36.7	43.0	40.0	...	...	25.0
Bartlett pears							
10% lye	...	14.0	...	10.0	6.5	3.5	...
10% lye + 0.5% A.A.S.....	...	12.0	...	7.5	5.0	3.0	...
Percentage time reduction.	...	14.3	...	25.0	23.0	14.3	...
MacIntosh apples							
10% lye	...	14.0	...	8.0	5.5	5.0	...
10% lye + 0.5% A.A.S.....	...	11.5	...	6.0	4.0	3.5	...
Percentage time reduction.	...	17.8	...	25.0	27.3	30.0	...
Quinces							
10% lye	...	14.5	...	9.0	6.0	3.5	...
10% lye + 0.5% A.A.S.....	...	11.5	...	6.5	4.5	3.0	...
Percentage time reduction.	...	20.6	...	27.8	25.0	14.3	...

TABLE II—Effect of Alkyl Aryl Sulphonate (A.A.S.) on Peeling Time of Root Vegetables.

Lye conc. (%)	1	5	10	20	30	40	50
Boiling temperature (°F)....	..	215	218	225	240	270	290
				Peeling time, sec.			
Potatoes							
Lye alone	420	270	180	150	30	20	7
Lye + 0.5% A.A.S.	312	210	132	102	24	20	7
Percentage time reduction.	25.7	22.2	26.6	32	20	0	0
Carrots							
Lye alone	210	132	72	42	8	4	..
Lye + 0.5% A.A.S.	150	72	42	30	8	4	..
Percentage time reduction.	32.3	45.5	41.7	28.6	0	0	..
Celery root							
Lye alone	270	120	90	60	..	..	..
Lye + 0.5% A.A.S.	192	90	60	42	..	..	..
Percentage time reduction.	28.9	25	33.3	30	..	..	..
Turnips							
Lye alone	240	120	60	30	..	..	..
Lye + 0.5% A.A.S.	150	60	42	18	..	..	..
Percentage time reduction.	37.5	50	30	40	..	..	..
Beets							
Lye alone	450	240	120	60	..	..	..
Lye + 0.5% A.A.S.	400	150	90	41	..	..	..
Percentage time reduction.	11.2	37.5	25	30	..	..	..
Parsnips							
Lye alone	242	150	102	72	..	..	..
Lye + 0.5% A.A.S.	180	90	60	42	..	..	..
Percentage time reduction.	28.5	40	41.2	41.5	..	..	..

TABLE III—Peeling Time Reductions Effected by Alkyl Aryl Sulphonate (A.A.S.).

Fruit or vegetable	Processing temperature	Peeling time reduction (%) 10% lye vs. 10% lye + 0.5% A.A.S.
Peaches	140	58.3
Quinces	140	27.8
Apples	140	25.0
Pears	140	25.0
Parsnips	Boiling	42.7
Carrots	Boiling	40.0
Celery root	Boiling	33.3
Potatoes	Boiling	25.0
Turnips	Boiling	25.0
Beets	Boiling	25.0

TABLE IV—Peeling Temperature Reductions Effected by Alkyl Aryl Sulphonate (A.A.S.).

Fruit	Temperature (deg.F.) required to peel fruit in 5 min. 10% lye	10% lye + 0.5% A.A.S.	Temperature reduction (deg. F.)
Apples	175	147	28
Quinces	168	155	13
Pears	170	160	10
Peaches	127	118	9

TABLE V—Lye Concentration Reduction Effected by Alkyl Aryl Sulphonate (A.A.S.).

Vegetable	Concentration of lye required to peel vegetables in 1.5 min. at the boil Lye	Lye + 0.5% A.A.S.	Lye concentration reduction due to A.A.S. (percent)
Parsnips	12.6	5.0	60.0
Turnips	6.6	2.4	63.6
Carrots	8.3	4.0 (approx.)	51.7
Potatoes	20.0	15.8	21.0
Beets	13.8	10.0	27.6
Celery root	10.0	5.0	50.0

The reduced immersion times permit increased production from existing equipment. Reductions in processing time effected by alkyl aryl sulphonate in lye baths are presented in Table III.

Reduced lye concentrations may be used in the presence of the alkyl aryl sulphonate to effect chemical peeling in a given period of time. By operating in this manner, employee hazards may be reduced. The data in Table V compare the lye concentrations necessary with and without alkyl aryl sulphonate in the systems used for peeling vegetables.

Lye was found to be a much more desirable disintegrating agent than hydrochloric acid. The latter was effective on the skin of peaches (Fig. 3) as reported by Olsen, but had little or no value in the peeling of the other fruits studied. Of the six vegetables with which this work deals, only carrots were successfully peeled in hydrochloric acid solution and then it was necessary to operate at the boiling point. Inasmuch as this acid is volatile, its use at high temperatures is undesirable.

Conclusions

1. Alkyl aryl sulphonate reduces the chemical peeling time of all the fruits and root vegetables studied in lye concentrations of less than 36 percent.

2. Reduction in chemical peeling times, temperatures and lye concentrations by the use of the alkyl aryl sulphonate offers the food processor the advantages of: (*a*) In-

(*Turn to page* 126)

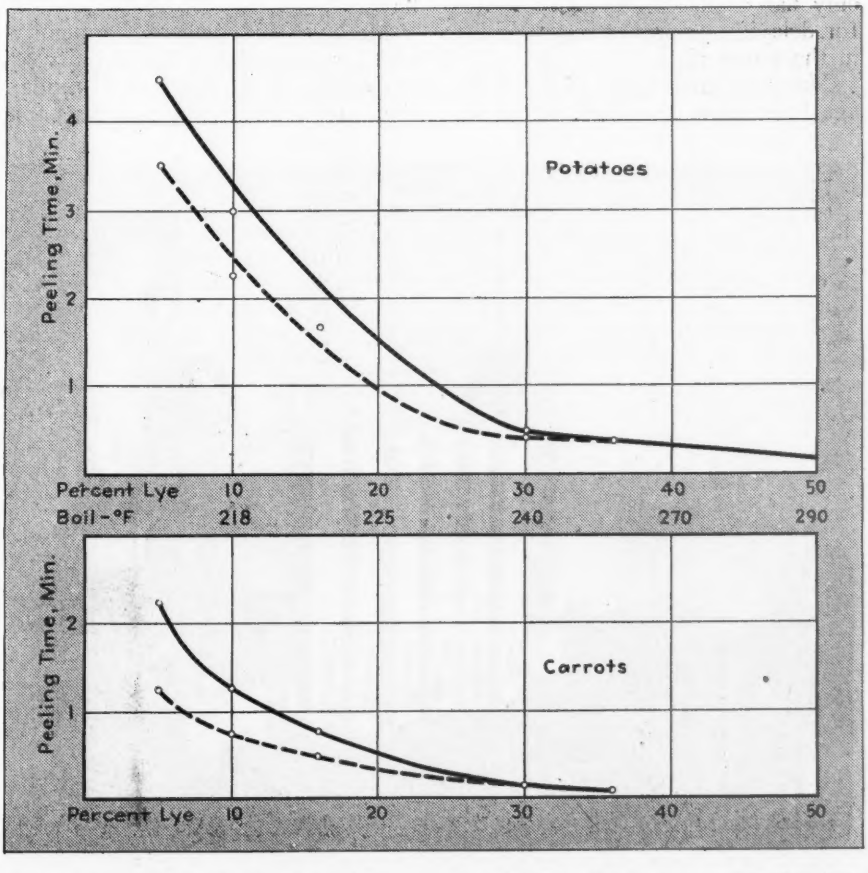


FIG. 6. Effect of alkyl aryl sulphonate on peeling time of potatoes and carrots (lye; lye + 0.5 percent A.A.S., broken line).

How To Evaluate and Improve The Stability of Fatty Foods

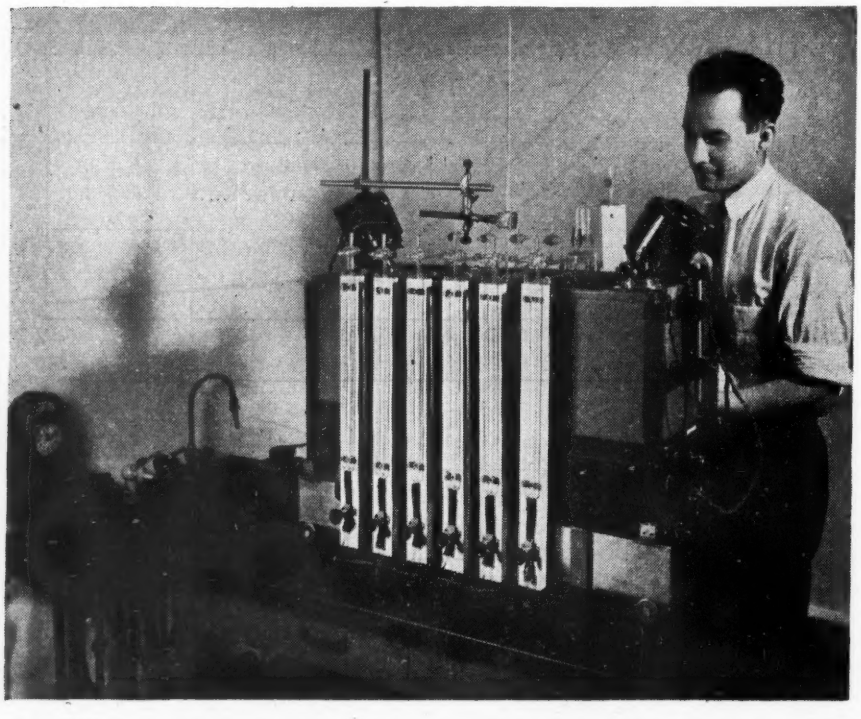
By R. W. RIEMENSCHNEIDER and WALDO C. AULT,
Eastern Regional Research Laboratory,* Philadelphia, Pa.

In this comprehensive discussion, the authors tell how to detect oxidative rancidity and make stability tests. They also describe antioxidants and outline their use for increasing the stability of fats and fatty foods

PREVENTION of rancidity is of great economic importance, not only in foods consisting principally of fat, such as lard and salad oils, but also in a large number of foods containing smaller proportions of fat. Among the latter are biscuit and pastry mixes, crackers, potato chips, dried milk and dried eggs, cereals and flours. Recognition of the vital importance of fats, oils and fatty foods in world economy has aroused interest in means for delaying or preventing rancidity in these materials.

Many different types of fat spoilage have been described in the literature.[1] The most important, however, are attributed to oxidation of the fat by atmospheric oxygen and may be referred to as oxidative rancidity. Air dissolved in the fat or in contact with its surfaces reacts with it, forming unstable oxygenated compounds. These compounds, which are peroxidic, undergo further oxidation and decomposition into the substances that are chiefly responsible for rancid odor and flavor.

Methods for detecting rancidity and for determining the stability or resistance of the product to oxidation, and a discussion of means for delaying or preventing these undesirable changes, form the basis of this paper. The term *rancidity* as used here refers only to *oxidative rancidity,* unless otherwise qualified. Emphasis is placed primarily on fats and oils rather than on innumerable products containing fat, because to a large extent, the stability of these products to oxidative rancidity depends upon the stability of the fat contained in them.



Barcroft-Warburg apparatus used in the oxygen absorption method for measuring fat stability.

Detection of Rancidity

The complex chemical changes involved in the oxidative determination of fats are not completely understood. Moreover, the nature of these oxidative changes may vary considerably from one substrate to another, particularly under variable conditions of exposure to heat, air and light, thus giving rise not only to different proportions of the decomposition products but, in some cases, to entirely different products. Despite the complexity of the oxidative reaction and the multiplicity of reaction products, the typical odor and flavor of rancidity seem to be definitely associated with the presence of aldehydic substances, and some of the chemical methods for the detection of rancidity are in reality aimed at qualitative or quantitative estimation of this class of compounds.

Ability of individuals to detect the typically unpleasant odor or taste characteristic of rancid substances may vary considerably; even the same person may vary in this respect from time to time. Moreover, these qualities do not lend themselves readily to either qualitative or quantitative description. For these reasons, much effort has been devoted to the development of chemical tests for detecting rancidity, and although none of the tests proposed to date correlate as well as is desirable with actual organo-

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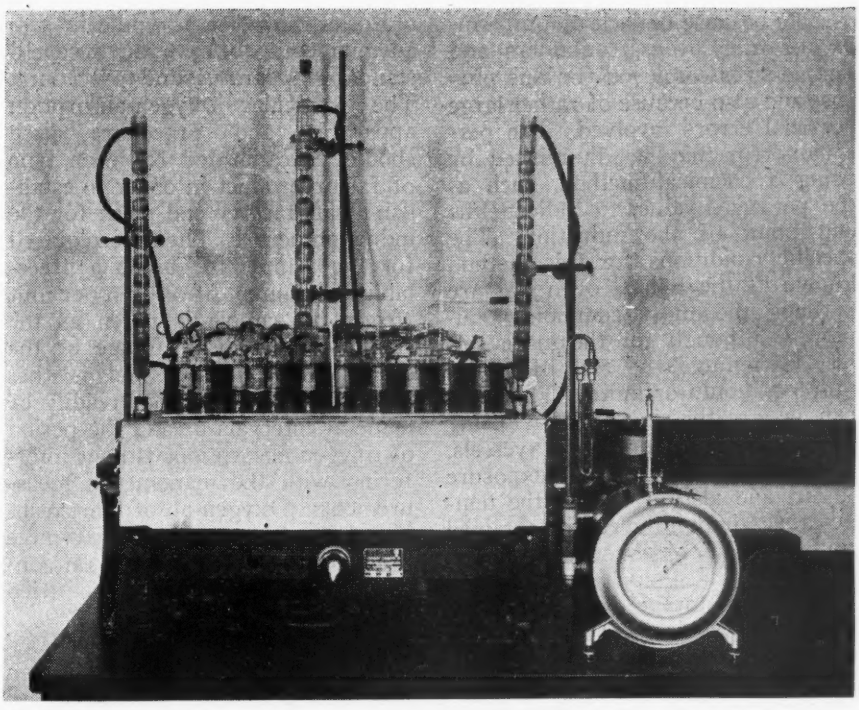
leptic tests, the use of one or more of them for confirmatory purposes is recommended.

Organoleptic tests for odor and flavor are considered to be the most important and reliable means of detecting rancidity, even though numerous chemical tests have been proposed. Suggestions helpful in the selection of individuals who are above average in sensitivity to odors and flavors have been reported.[2,3] For practical reasons, it may be necessary to limit the number of individuals on the tasting panel to three, and preferably to those who have acquired considerable experience and interest in rancidity problems. Certain factors, such as temperature of the sample, limitation on time to avoid sensory fatigue, and environmental conditions, should be standardized insofar as possible.

Chemical methods for detecting rancidity have been reviewed extensively by Lea.[1] Only a few of the more widely used methods will be discussed here. The Kreis test consists of treating the sample of fat with concentrated hydrochloric acid and a solution of phloroglucinol. A positive reaction depends upon the presence in the fat of epihydrin aldehyde, its acetal or precursors of this aldehyde. The red color formed in the reaction is attributed to a condensation product of epihydrin aldehyde with phloroglucinol. Quantitative measurements of this color may be made by comparing it with Lovibond glass color standards[4] or by the use of a photometer.[5] It has been shown that during the induction period (prerancid period) the development of color, shown by the Kreis test, parallels the development of fat peroxides. This suggests the possibility that the hydrochloric acid used in the test may react with the fat peroxides to form compounds of similar character to epihydrin aldehyde. Certain crude vegetable oils, even when fresh, contain interfering substances which give a red color with phloroglucinol. This limitation is not serious, however, since refined oils and animal fats are more likely to require examination, and these do not contain the reacting substances. In our experience, every rancid fat has given a positive Kreis reaction. For most satisfactory application of the test, it should be calibrated against odor and flavor under the particular set of conditions of aging and on each type of fat. In this way, a definite color intensity may be established to serve as an indication of rancidity.



Swift stability apparatus used in the active oxygen method for measuring fat stability.

The peroxide value[6] also has been used extensively as a guide in the detection of rancidity. Like the Kreis color, the peroxide value should be calibrated against odor and flavor for the particular type of fat and set of conditions. Thus a peroxide value of 20 milliequivalents ordinarily is a satisfactory "end point" for lard, provided the sample has been under observation during the fresh stage. The peroxide value, however, should not be relied upon for the detection of rancidity in miscellaneous samples of unknown history and treatment; for example, the distinctive flavor and odor caused by exposure of fats to light, even diffuse daylight, does not seem to be correlated with the peroxide value.

The Schiff reaction for aldehydes[7] and modified Schiff test[8] may also be used to supplement other chemical and organoleptic evaluation of fats. They are also subject to the same limitations as the peroxide value and the Kreis test. None of these chemical tests should be made the only criterion of rancidity, but they are helpful in confirming the organoleptic judgments.

In certain products—for example, cereals, flours and crackers—it may be necessary to extract the fat from the sample with a solvent before carrying out chemical tests for rancidity. Anhydrous peroxide-free ethyl ether is reasonably satisfactory for this purpose, provided proper precautions are taken to avoid undue exposure of the fat to heat and air. Cold extraction and removal of the solvent under reduced pressure is desirable.

Stability Tests

More important to industry than merely the detection of rancidity are means of determining the stability of fats and fatty products. To avoid confusion of terminology, in this paper stability is defined as resistance to oxidative rancidity and may be expressed as the time required under specified conditions for the fat or fatty product to become rancid in odor or flavor. It is often impracticable, however, to determine the stability under actual conditions of commercial storage and merchandising because of the long time required in many instances for rancidity to develop. Moreover, these actual conditions — temperature, moisture, exposure to light and type of package—usually are variable. For these reasons a great deal of effort has been expended in attempts to devise rapid methods for determining stability. In these methods, the conditions of accelerated aging should be reproducible and permit relative stability evaluations, often within a working day.

Probably the simplest of the commonly used rapid stability determinations consist of heating the sample in a hot-air oven and examining it at intervals for rancid odor and flavor. With careful attention to standardization of conditions, fair reproducibility of results can be obtained. In different laboratories, however, results often are not com-

parable because of lack of uniformity of the ovens, containers and sample sizes employed for this purpose and also because of rather large personal errors involved. The personal error may be diminished by using a chemical method, such as the peroxide value, to indicate the end point of the induction. The specific conditions for this method known as the Schaal oven test are perhaps the most commonly employed, although for the more stable shortenings the test often requires a month or more.[9] This time can be greatly shortened by using smaller samples or larger vessels, thereby increasing surface exposure to air, and also by raising the temperature, though the results obtained under the more drastic conditions probably will show less correlation with actual storage data. Oven incubation is particularly adaptable for determining the stability of fat-containing products such as pastry, crackers, cookies, cereals and flours.

Another rapid method, commonly referred to as the Swift stability test,[10] has been used extensively, at least in this country. A uniform flow of washed air is bubbled through the sample, which is maintained at constant temperature by means of a boiling-water bath. The progress of oxidation is followed by periodic organoleptic tests and determinations of peroxide content. Under the conditions employed, rancidity in lard can usually be detected at a peroxide level of 20 milliequivalents per kilogram; this end point may be considerably different for other types of fats and oils. It is convenient to express the stability as the time required for the fat to attain the predetermined peroxide level. Several recent improvements in the apparatus and modifications of the procedure have been proposed.[11,12] This method has advantages over oven incubation. The sample can be maintained at a uniform and reproducible temperature; and the air and liquid fat are in equilibrium owing to saturation of the fat by continuous stirring with air, thus making reproducibility less dependent upon exactness of the ratio of surface exposed to the weight of the sample.

Measurement of oxygen absorption of fats as a means of determining their comparative stabilities is preferred by some investigators. For this purpose, the apparatus need not be complex. Simple types such as have been described[13,14,15] seem to be adequate. For comparison of results between different laboratories, however, it would be disadvantageous to have an accepted standard apparatus and procedure. The particular oxygen-absorption apparatus and procedure used should be calibrated for each type of fat or product in order to establish a satisfactory end point for the induction period. The time required for the sample to absorb a preestablished amount of oxygen per unit weight of sample is taken as the stability. One disadvantage of the oxygen-absorption method is that organoleptic tests cannot readily be made at intervals during the period of oxygen absorption without interfering with the manometric measurements. Oxygen-absorption technics have been used to determine the stability of certain dry fat-containing products, such as dried milk[13] and crackers.[16]

A number of other rapid methods for determining stability have been proposed but have not been used extensively, either because they are too complicated to be practicable or because they have not been thoroughly investigated. One fault in common with even the generally accepted methods is that they give only relative values under the empirical conditions of the test and may not bear a constant relationship to values obtained under other conditions, such as storage. Despite these inadequacies, however, methods for determining stability are valuable to industry as a guide in improving plant processes, in evaluating antioxidants and in maintaining standards of quality.

Increasing Stability

There are several practical approaches to the problem of delaying or preventing oxidative rancidity. Proper choice of raw materials and careful attention to processing conditions, with a view to eliminating or reducing exposure to air, light, excessive temperatures and contamination, particularly by metals, should be stressed as of first order in importance. Partial hydrogenation of products which are essentially pure fats almost invariably increase their stability. Packaging the finished product in such a manner as to exclude air and light will, of course, afford a considerable measure of protection.

Often, however, greater stability than can be obtained within the practical limitations of these methods will be desirable or necessary. In such cases antioxidants may be used. *In fact, in many cases the use of antioxidants appears to offer the greatest hope of a solution of the economic problem of oxidative rancidity.* In addition to being reasonably effective in delaying rancidification, an antioxidant for foods should possess a number of properties, which may be outlined briefly as follows:

It must have neither acute nor chronic toxicity in quantities considerably greater than those likely to be used, even when ingested over long periods of time.

It should have at least sufficient solubility in fat to facilitate its use; appreciable solubility will usually be advantageous.

It should not impart any objectionable odor, color or taste to the product either when freshly prepared or after storage.

It should be stable to whatever processing conditions the food in which it is used will be subsequently subjected.

It should be relatively inexpensive and available, or at least potentially available, in relatively large quantities.

Despite this imposing list of requirements, considerable progress has been made in this field. The granting of permission by the Meat Inspection Division of the War Food Administration to use four different antioxidant substances in lard, provided suitable declaration is made on the label, may be taken as an indication of this progress. These antioxidants are gum guaiac, lecithin, a concentrate of tocopherols in vegetable oils, and nordihydroguaiaretic acid (N.D.G.A.) The importance of these materials warrants a brief description of each.

Gum Guaiac—Gum guaiac, the resin from an evergreen tree indigenous to the West Indies, is chiefly produced in eastern Haiti. It is relatively inexpensive. The use of gum guaiac as an antioxidant in fats and oils was first disclosed in a patent[17] assigned to Swift & Co. It contains complex phenolic constituents, for example, guaiaretic acid, and presumably its action as an antioxidant is due to one or more of these substances. As might be expected from its chemical nature, it is an effective antioxidant and has been used commercially. The protective effect of gum guaiac is reported to carry over into baked goods such as piecrust and crackers.

Lecithin—With the development of the soybean processing industry in this country, large quantities of "commercial lecithin" became available at reasonable prices. Because

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Argentine Macaroni Is Different

The macaroni industry in the United States can profitably study and possibly adopt some of the manufacturing methods which are practiced in Argentina

By J. A. SHELLENBERGER, Department of Milling, Kansas State College, Manhattan, Kan.

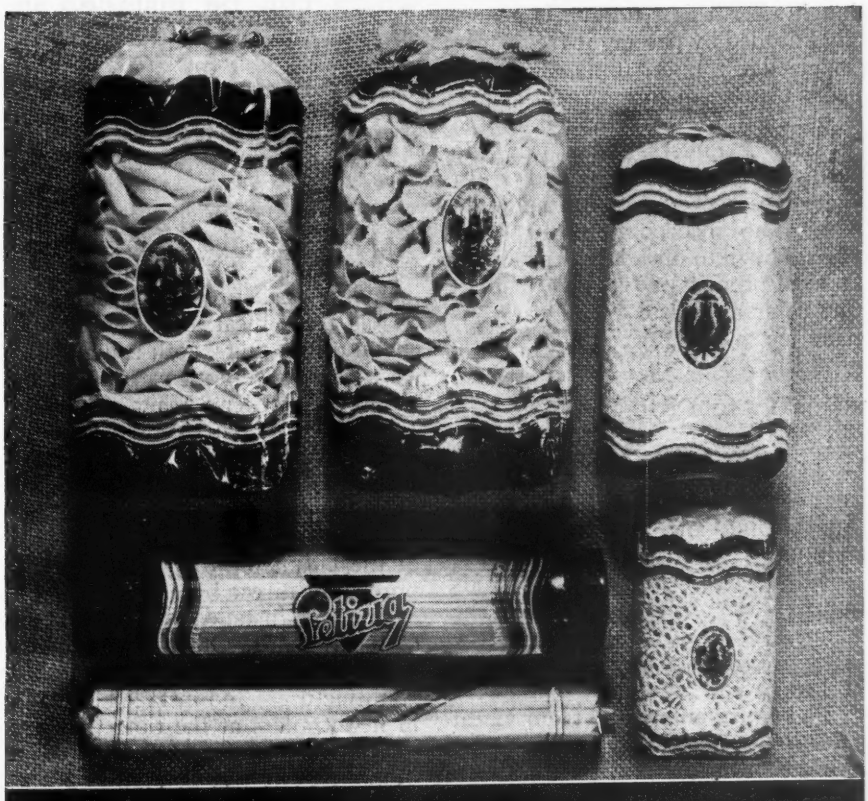
THERE are more people of Italian than Spanish extraction in Argentina, where approximately 87 percent of the population descend from Spanish and Italian immigrants. Naturally, there is a large consumption of alimentary pastes.

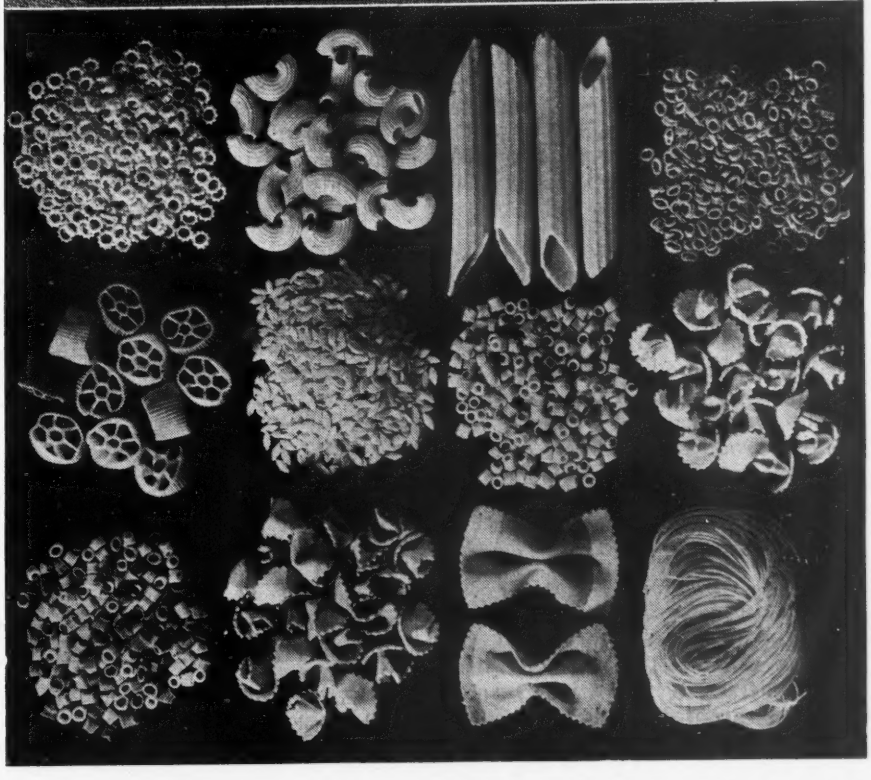
The successful development and growth of a macaroni industry in Argentina is of special interest because it is not based primarily on true macaroni types according to our standards.

Genuine macaroni should be sufficiently rich in gluten to bear its own weight without breaking during drying. In the United States and Canada, durum wheats are generally considered to be superior for alimentary pastes. But there is practically no durum wheat grown in Argentina. Even if Polish wheat, which is grown to some extent, is included with the durum, less than 0.5 percent of the country's total production is of a type ordinarily considered in the United States as suitable for the manufacture of high quality macaroni. Nevertheless, the macaroni products made in Argentina are consumed in large quantities by a people of very discriminating tastes. In addition, Argentina has also developed an export business with several other South American countries.

Sizes Vary

There is only a limited production of the regular hard wheat semolina type macaroni, but there is a tremendous volume of business based on the manufacture of products of various sizes and shapes which are dried flat and do not require the same physical properties in the dough as for the manufacture of sticks and pipes. These vary in composition, color and shape, thus giving the purchaser ample opportunity to make





Above: Macaroni products are sold in attractive packages.

Below: Many different types of macaroni are manufactured in Argentina.

selections to suit individual preference.

There are several very large and modern macaroni factories in the country. At least in the larger factories up-to-date processing methods are used throughout. Most of the equipment is of European design and manufacture, but the plants present the same general characteristics as are seen in the United States and the equipment and methods are very similar. For example, the stiff dough after a first mixing is generally kneaded by passing it frequently under edge runners until a homogeneous mass of the proper consistency is obtained for transferring to the pressure cylinders. Many of the pastes contain finely ground fresh vegetables such as spinach and carrots. The incorporation of fresh vegetables into the dough produces finished products possessing distinctive color and taste as well as contributing to the nutritive value of the product.

Up to Date Plants

In the more modern plants macaroni is dried in specially constructed compartments equipped with air conditioning and air filtration apparatus. The specialty items are dried on trays, while racks and rods support the long-cut types. The temperature and humidity of the drying rooms are carefully controlled.

The entire enterprise from wheat selection to packaging is done under fairly thorough supervision and control in most of the factories, and great effort is made to maintain clean, sanitary premises and equipment. Employees are usually dressed in neat, clean uniforms. At the present time the ratio of women to men employees in this industry is approximately three to one.

Standards

In this country, a soft yellowish colored, rough textured, elastic, hard, and smooth-fracturing alimentary paste is considered preferable. Color is usually given great importance in grading macaroni here, and the Argentine product is definitely inferior in this respect. However, from the standpoint of volume increase during cooking, resistance to disintegration, and tenderness after cooking, Argentina macaroni is of satisfactory quality.

Anyone who has ever lived in Argentina can attest to the fact that very attractive, appetizing, and novel macaroni dishes are served in both restaurants and homes.

Ready-Made Coolers For Food Trucks

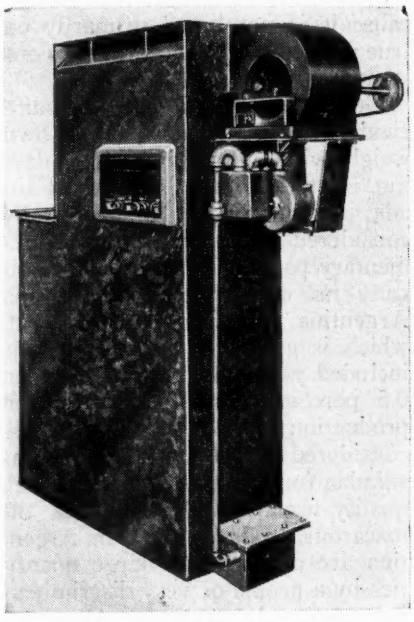
Two low-cost, prefabricated, water-ice refrigerating units which can be installed in any truck or trailer body to preserve quality of perishable foods in transit.

READY-MADE coolers for truck and trailer bodies may be had for the haulage of perishable foods, including such prechilled commodities as fresh meat, butter, eggs and cheese. Two units, both using water ice as a refrigerant, are offered by Dromgold & Glenn, Chicago.

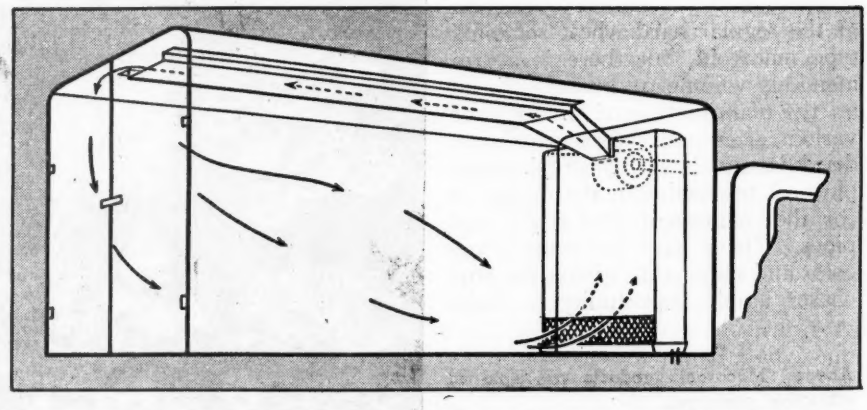
The equipment is available throughout the United States and costs between $300 and $450, depending upon the conditions surrounding installation. About half of the Drumgold & Glenn units are purchased direct by food field fleet owners and installed by local garages or repair shops. Other units are distributed through the various trailer manufacturers and installed by them in new trailers at the time they are purchased. The installation of a cooler unit is not complicated and can be done by following drawings and instructions furnished by the manufacturer.

The produce type of cooler is designed for use by growers, handlers or brokers in the transportation of all kinds of perishable products. Such commodities, arriving at the market under refrigeration, assure higher prices and ready sale because they are fresh, crisp and attractive in appearance.

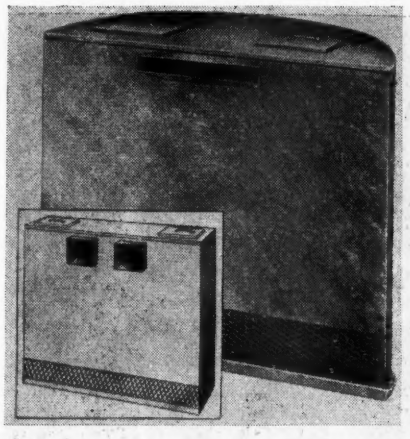
The produce unit is made in two types. One type includes a rectangular-shaped water ice container to fit inside the front ends of the square-cornered truck bodies. The other type has a rounded front end to fit into the nose of conventional round-ended trailer bodies. The water ice capacity of each unit varies



This is a close-up of the ice-container, the spray nozzles, the blower fan and the brine-circulating centrifugal pump, with the strainer box appearing at the bottom.



This drawing shows the position of the produce unit inside the truck or trailer body together with the ceiling air duct that circulates the cold air in closely packed loads. The engine that drives the blower shown here is mounted on the outside of the body.



Two types of the produce cooler described in this article. The ice container with the rounded front fits in the nose of conventional trailers. The square cornered one is for regular straight truck bodies.

from 1,500 to 2,000 lb., depending upon whether cake or crushed ice is used.

Each unit has a 3-hp. gasoline engine, mounted on the outside front end of the truck or trailer body, and a blower-type fan at the top of the ice container. The engine drives the fan to circulate the air inside the body, through ducts inside the ice container, where it is cooled to temperatures as low as 18 deg. F.

The ice is loaded into the containers from inside the body through hatches in the tops of the containers. The containers are made of heavy-gage iron, hot-dipped galvanized after fabrication. This treatment helps to prevent rust and corrosion.

As the water ice melts, it is drained off through pipes in the body floor. Condensation of moisture on the exterior of the container is collected by a drip pan on the bottom. This assures a dry floor.

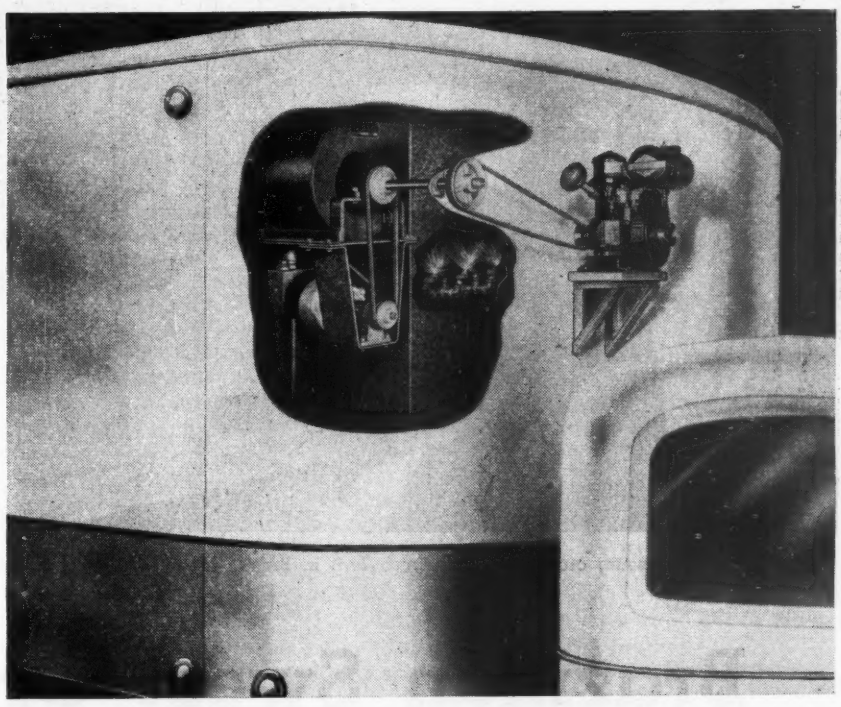
In cases where the load carried is closely packed, circulation of the cool air throughout the body and load is accelerated by the use of a duct on the body ceiling. This is not a part of the standard equipment but may be installed as required. Such a duct is shown in one of the accompanying illustrations.

A spray-type unit, to be used when the food products to be hauled are prechilled, also is available. The spray unit uses water ice, and the air is circulated through a cold brine spray. The container holds only 600 lb. of ice, because not so much refrigeration is required when the foods are prechilled.

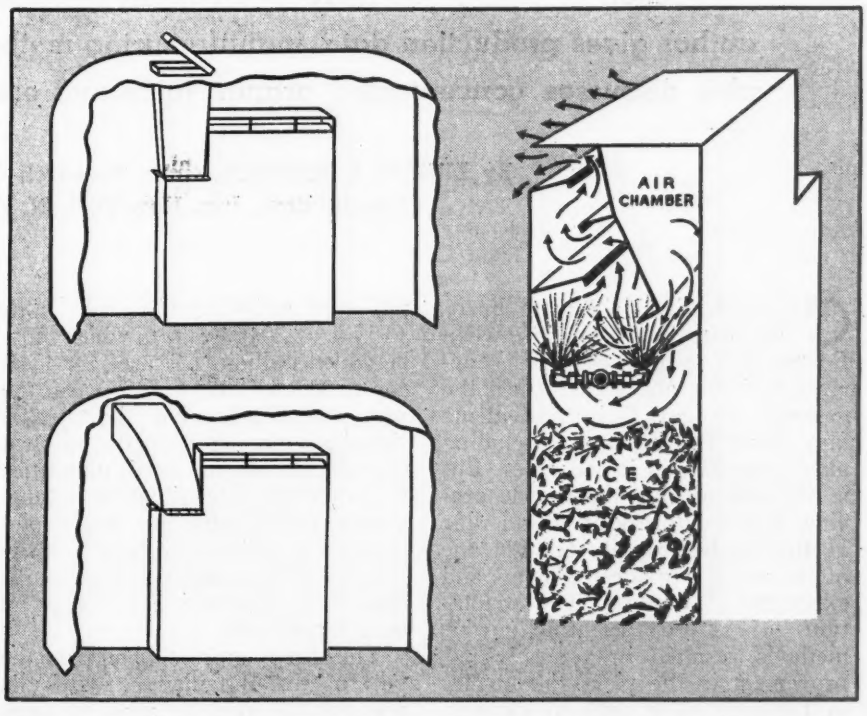
The spray unit uses a 1½-hp. gasoline engine, as compared with the 3-hp. engine of the produce cooler. For reicing in transit, the spray unit may be fitted with an outside hatch. This may be located on the body, roof or front end. To prevent leakage of the cold air, this hatch is made airtight.

The spray unit has a ball-bearing centrifugal pump to circulate the cold brine to the spray nozzles, the pumping system being equipped with a strainer. The weight of the spray unit is 450 lb., including the engine. It occupies a space 16 by 48 in., and is 74 in. high.

With constantly increasing emphasis being placed on the higher vitamin value of perfectly fresh and unblemished fruits and vegetables, such advances in safe distribution, as the one described in this article, assume added significance.—THE EDITORS



This cutaway of the spray type cooler shows how the small gasoline engine is mounted on the outside of the body at the front.



At the left are drawings of a roof and a front-end loading hatch for the spray-type coolers. The cutaway at the right illustrates how the cooling is accomplished by passage of air over the ice and brine sprays whence it is blown through the body ducts.

Courtesy of E. Van Parys

Expressing orange oil from fresh fruit in Brazil. Modified Avena machines are used for this purpose.

Brazilian Sweet Orange Oil

Production of orange oil increased rapidly in Brazil from 1939 to 1942. The author gives production data, manufacturing methods and properties. He also discusses concentrated orange juice and orange wine and brandy

By ERNEST GUENTHER, Chief Research Chemist,
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CITRUS FRUITS were introduced to Brazil in 1549, when Portuguese Jesuit missionaries arrived in Bahia and transformed the grounds around their settlements into beautiful orchards including many orange and lemon trees. But it was only during the decade previous to the outbreak of World War II that Brazil rapidly became one of the world's greatest growers and exporters of oranges. The adaptation of more scientific grove methods resulted in a steady improvement in the yield and quality of the fruit. The peak of exports, which went mainly to Europe, was reached in 1939, with about 5.5 million cases of oranges [a standard case weighing about 45 kilos (1 kilo=2.2046 lb.)], to which must be added millions of cases for local consumption. The outbreak of the war and the ensuing shortage in shipping space practically stopped exports, except for small quantities to Argentina. The situation became almost catastrophic for the growers, and in order to dispose of their surplus fruit, many packing houses decided to process it for orange oil on a large scale.

The idea of expressing oil from the peel of the Brazilian citrus fruits was actually nothing new, as some commercial attempts to this effect had already been made in 1930. At that time, some producers, probably immigrants from Sicily, had tried to introduce the Sicilian sponge method which, however, proved too costly and had to be replaced by mechanical means, as described below. After 1939, however, orange oil production increased rapidly and reached its maximum in 1942, with the surprising quantitiy of about 400 tons. This amount so far exceeded the demand and possible consumption on the part of North and South America that the oil prices dropped from 60 cruzeiros per kilo in 1942 to about 20 cruzeiros in the beginning of 1944.

This decline in turn made the extraction of oil absolutely unprofit-

able, as a price of 20 cruzeiros (about $1.00) per kilo will not even cover hauling the fruit from the groves to the factory and expressing the oil, even if the fruit were given away by the growers.

Completely discouraged, most packing houses therefore stored away their oil-making equipment and, due to lack of export facilities, closed shop or reduced their activities to supplying only the limited home market of fresh fruit. At present there exists in Brazil altogether about 200 operators and packing houses equipped for the expressing of oil, most of them (about 170) being located in the state of Sao Paulo, mainly around Limeira, the balance in the state of Rio de Janeiro and some in Rio Grande do Sul. Only a very few of them are manufacturing oil during 1944 and usually only upon firm orders, because most manufacturers and exporters still have an hand very large unsold stocks of old oil which evidently they expect to dispose of first before again starting to make new oil. According to various estimates, the old stocks of Brazilian orange oil amount to about 300 tons or more, most of which has been manufactured with insufficient care and experience during the boom days of 1942, or has since suffered in quality by prolonged storing and by oxidation in the hot climate of Brazil. In fact, these large unsold stocks of old and inferior orange oil are causing considerable concern to the Brazilian government. Decrees are being considered according to which the old oil should be fractionated, the terpenes employed in paints instead of the scarce imported turpentine oil, and the residue used for the scenting of Brazilian soaps. Any such government decree would, however, not affect the new oil which the various manufacturers are prepared to make upon orders from abroad or which they expect to sell. If all potential manufacturers would reinstall their oil-making equipment and operate at full capacity, Brazil could probably produce from 350 to 400 tons of expressed orange oil per year. As conditions are now, the total production during 1944 will very likely be not more than 20 tons, unless higher prices encourage and warrant the production of large quantities.

Brazil's Citrus Industry

Brazil's citrus industry is favored by cheap and abundant labor (resulting in comparatively low-cost production), by little need for irrigation, by the absence of frosts and by generally rich soils which require little fertilization. From the beginning, however, Brazil's groves have been planted too closely, and many diseases—for instance, *mal di gomma*, psorosis, leprosis and fruit scab—are causing a great deal of damage. During the past few years, when exports were no longer possible, diseases and insect pests have affected the orchards to such an extent that many are practically ruined. Under present conditions, the growers no longer can afford to spend the necessary money on spraying, fertilizing and other cultural cares. This, indeed, presents a serious threat to the future of the once so prosperous Brazilian orange industry. Since the life span of the average Brazilian orange tree is relatively short, experienced and farseeing Brazilian growers with sufficient capital already are laying out new groves in the expectation that these new plantings will be in full production when exports are again possible after the war and when many of the old groves have perished. In the opinion of these progressive growers, Brazil never produced sufficient oranges to fill the world's demand for fresh fruit.

Orange Varieties

The two orange varieties most extensively grown in Brazil are the Bahia or Baia, an early Washington Navel which makes up almost nine-tenths of the exports, and the late ripening Pera or Pera do Rio. The Pera, a small, nearly seedless, oval and well-colored orange with a small greenish zone around the stem, resembles the Valencia. More recently a new navel orange, the so-called Bahianinha (little Bahia) has also been planted, especially around Sao Paulo. It has a smaller fruit, a smaller navel and a thinner skin than the regular Bahia. Navarro de Andrade[1] considers it an ideal type for export.

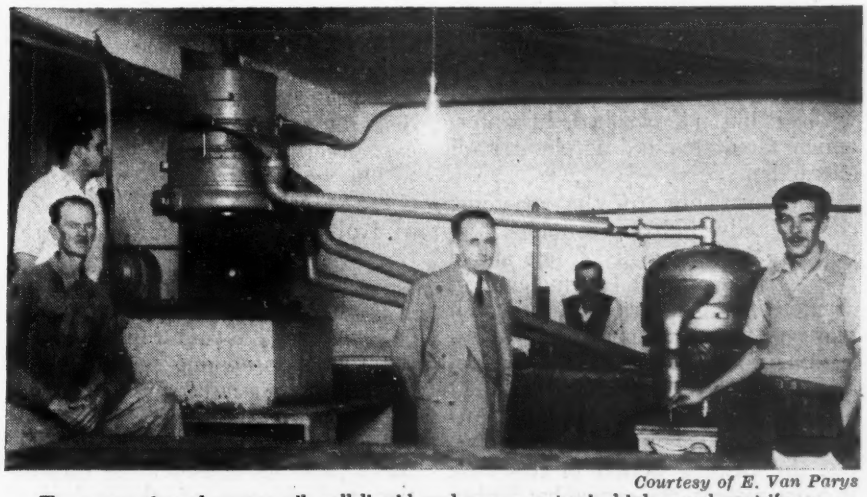
Producing Regions, Climate

Citrus groves extend over a large part of Brazil's inhabited sections, especially along and not far inland from the Atlantic Coast. The principal growing areas are in the State of Sao Paulo and Rio de Janeiro, with smaller plantings in Rio Grande do Sul, Bahia, Espirito Santo, Pernambuco and Minas Geraes. In the latter state, however, most fruit is consumed locally, as the lack of roads prevents shipping the fruit to the coast.

The largest producing area is on the high rolling table lands (1,500 to 2,500 ft. altitude) of the state of Sao Paulo, almost 100 miles inland from the coast and 50 miles from the city of Sao Paulo, in the following departments: (1) Limeira —the principal center about three hours by railroad from Sao Paulo, (2) Campinas, (3) Araras, (4) Rio Claro, (5) Sorocaba.

The temperature in that subtropical climate almost never falls sufficiently low to damage the fruit. In the Sao Paulo section, about 80 percent of the orange trees are of the Bahia variety, only about 8 percent of the Pera variety, and some Valencias. The Bahias ripen from April to June and used to be shipped to reach Europe after the peak of the Spanish oranges and just before the South African navels arrived. The Pera of Sao Paulo is harvested from June to October. Regarding exports of fresh oranges, Sao Paulo is less important than

[1] Manual de Citricultura I. Edicao da Chacaras e Quintaes, Soa Paulo, 1933.



Courtesy of E. Van Parys

The separation of orange oil, cell liquid and spray water in high-speed centrifuges.

Rio de Janeiro, the population of Sao Paulo consuming more fruit locally. As far as oil production is concerned, Sao Paulo far exceeds Rio de Janeiro because the fruit grown in Rio de Janeiro (mainly the Pera variety) yields only half the quantity of oil which thereby becomes too costly and cannot compete with the oil from Sao Paulo. About 70 percent of Brazilian orange oil is thus expressed from the Bahia or Washington Navel orange, and only 30 percent from the Pera.

In the state and federal District of Rio de Janeiro, the orange plantations are grouped quite closely and located mainly in the tropical lowlands near the Bay of Rio de Janeiro, about 20 to 50 miles from that great and beautiful city. Most of the fruit grown there is of the Pera variety (Pera do Rio) which, previous to World War II, was mainly exported as fresh fruit and is now consumed locally. The harvest takes place from August to December. Compared with Sao Paulo, Rio de Janeiro produces much less oil.

Manufacturing Methods

As mentioned, the first experiments of expressing orange oil in Brazil were made according to the Sicilian hand-sponge method which, however, had to be abandoned as too cumbersome and costly. Later, several types of machines were imported from Messina, primarily the Avena which gave good results and was, therefore, quickly imitated by local constructors. In the opinion of Brazilian producers, the firm Irmaos Ruegger in Araras, Est. de Sao Paulo, even succeeded in improving on the Avena. Today, about 300 to 400 such models exist in Brazil. The larger producers, mainly fruit packing houses, are usually equipped with several machines, arranged in battery form.

Before being charged into the feeder, the fruit is first soaked and washed, but not brushed, in water, which facilitates and accelerates oil extraction.

The extractor of the machine, constructed of iron, contains two horizontal rotating disks, one above the other, and 1.15 meters in diameter, which are covered with glass plates containing many protruding points. The inner walls, too, are lined with curved and pointed glass plates. Some operators employ pointed stainless steel plates, but the rasping action in this case is more violent, the somewhat higher yield of oil being offset by the formation of a heavier emulsion, and an oil with a higher evaporation residue (higher content of waxy matter) and a darker color. About three quarters of a case of oranges is then charged through the feeder upon the two plates which turn at a speed of 50 to 80 r.p.m. The speed of rotation and quantity of fruit charged must be controlled carefully, otherwise the fruit might be crushed or broken. The fruit tumbles and brushes against the pointed horizontal disks and vertical side walls, thereby lacerating the oil sacs and liberating the oil. Depending upon the condition of the fruit, treatment of one charge lasts about two minutes, riper and softer oranges requiring less time than greener and harder ones. The speed of rotation can be adjusted through the pulleys of the 3-hp. motor or through the axle wheels. While the fruit turns and tumbles in the extractor, a continuous spray of water, injected above the disks, carries the emulsion of liberated oil, aqueous cell liquid and cell detritus into a system of strainers. This consists of several metal sieves of progressively finer mesh. The emulsion is thereby freed from the coarser particles of solids. The remaining liquid emulsion must then be broken up into oil and water, a very important procedure, as we shall see below. The carrier (spray) water is used over and over again for about ten hours and then replaced by fresh water. It is returned to the spray nozzle above the rotating disks by a pump of 15 to 20 liters capacity per minute.

The working capacity of one machine varies from 300 to 400 cases of fruit during ten hours of operation.

TABLE I—Physico-Chemical Properties of Brazilian Orange Oil

Date of production	Specific gravity at 25°	Optical rotation at 22°	Refractive index at 20°	Evaporation residue	Color
Type Bahianinha Oranges—Decanted Oil					
4/14/42	0.8445	+98°6′	1.4735	2.20%	Green-yellow
4/30/42	0.8437	+97°29′	1.4732	2.33%	Yellow-green
5/30/42	0.8434	+97°27′	1.4730	2.75%	Amber
6/30/42	0.8470	+96°12′	1.4734	4.22%	Amber
Type Baia Oranges—Centrifuged Oil					
5/6/42	0.8425	+98°27′	1.4725	1.44%	Yellow-green
5/16/42	0.8429	+97°33′	1.4725	1.48%	Yellow
6/3/42	0.8433	+97°15′	1.4725	1.77%	Amber
6/12/42	0.8433	+96°41′	1.4730	2.14%	Amber

Separation of Effluent

The complete and rapid separation of the outflowing emulsion consisting of oil, aqueous cell liquid, carrier water and fine cell detritus (mainly colloidal and waxy matters) presents considerable difficulties and is one of the principal factors of affecting the quality of the final oil. The less the oil stays in contact with water, the better will be its quality. Two methods are generally applied, separation by decanting in large settling tanks and centrifuging.

Decanting

After being strained, the effluent is pumped into a series of large wooden tanks where the fine emulsion is permitted to settle until it separates, which often requires several days. During this time, forces of oxidation, fermentation, hydrolysis and polymerization, activated by enzymes, are at play and, in the warm climate of Brazil, may cause serious degradation in the delicate constituents of the oil. Some of the oxygenated compounds, incidentally, are more soluble in water than the terpenes and may, therefore, be lost in the large quantities of carrier water, especially at the prevailing temperature.

The mass finally separating above the water layer is by no means clear; often it represents a heavy emulsion of oil, colloidal waxy matter, and some water, which can be broken by packing the mass into hydraulic presses and pressing it through heavy cloth lined with cotton or sponges.

This method of separating the effluent, though on the whole not very satisfactory, has unfortunately been adopted by most operators, especially by the smaller ones, who are limited in regard to cost of installation. The oils thus obtained usually have a dark color, a high evaporation residue (content of waxy matter) and frequently an "off" odor.

Centrifuging

Progressive and well-equipped manufacturers separate the extractor effluent in high-speed centrifuges, for instance in De Laval machines.

After the bulk of solid particles has been removed by running through a system of metal sieves, the liquid emulsion flows into a

large supercentrifuge which separates it into water, waxy matter and crude oil. The latter then runs directly into a smaller centrifuge where it is clarified and freed from any suspended water (about 20 percent). All separated water is pumped into a large tank, from there returned to the extractor and injected again as carrier water (see above).

The different clarified oil lots should finally be bulked into uniform lots and stored air-tight in well filled bottles, in cool, dark rooms.

Quality of the Oil

It is a fact that the quality of Brazilian orange oil has not infrequently caused disappointment on the part of buyers abroad. This is due primarily to lack of experience and to poor equipment employed by the numerous small operators who, after the outbreak of World War II, started to manufacture large quantities of oil in order to dispose of their surplus fruit. The causes for the poor quality of the accumulated large stocks of Brazilian orange oil may be summarized as follows:

1. In most cases the separation of the extractor effluent consisting of essential oil, aqueous cell liquid and colloidal matter was effected by decanting and standing for a prolonged time in large settling tanks, which procedure causes considerable degradation of the oil. As explained above, the most efficient method of breaking up this emulsion is by running the effluent directly into a system of high-speed centrifuges. Only a few operators have so far adopted this procedure.

2. Frequently, the accumulated stocks of oil have been stored improperly, often in half filled drums not hermetically sealed against access of air. Orange oil easily oxidizes under those conditions, especially in the warm climate of Brazil. It is not surprising that after a lapse of several years those old stocks have now become of quite inferior quality, no longer suited for flavor work.

3. Not all Brazilian operators possess the facilities of bulking their oil into uniform large lots, with the result that the exporter abroad received shipments in which each drum represented a different quality.

These shortcomings, however, can easily be remedied and, as a matter of fact, some of the leading manufacturers in Brazil have been able to ship qualities which, though not equal to the best grades of hand-pressed oils, nevertheless compare well with machine pressed oils from other countries. As the young Brazilian orange oil industry acquires more experience, it may eventually offer on the world market oils more acceptable as to quality and particularly uniformity than those which we know today.

Byproducts

As pointed out, the Brazilian orange packers sought in the processing of their surplus fruit for oil a means to alleviate the plight of the growers and exporters during World War II when they no longer could ship their crops to Europe. These expectations would probably have been fulfilled had it been possible to uphold the oil prices of about 70 cruzeiros per kilo, as prevailing in 1940. When, however, prices dropped to about 20 cruzeiros, the processing of the fresh fruit exclusively for oil became a definitely unprofitable business. In order to manufacture Brazilian orange oil on an economical basis, the fruit must be converted into all possible byproducts, orange oil being only one of them. For this purpose, some of the leading Brazilian packing houses, especially around Limeira in the State of Sao Paulo, have acquired the most modern equipment, imported mainly from the United States and installed by American engineers. Aside from the standard equipment for packing fresh fruit, these houses possess machinery for manufacturing concentrated juices, extracting pectin, making citric acid and converting the exhausted peel into cattle feed. The sweetened juice may be fermented and the orange wine distilled into orange brandy, both products being quite popular in Brazil.

Concentrated Orange Juice

After extraction of the oil, the fruit is crushed, the juice filtered, deaerated, flash-sterilized and concentrated in vacuum stills. After addition of sugar the concentrated juice is automatically filled into cans of 10 liters and hermetically sealed. This concentrated orange juice enjoys wide sales in Brazil for employment in many hotels, restaurants, and households as the base of orange drinks.

Courtesy of E. Van Parys

Harvesting oranges in Brazil.

Orange Wine

After extraction of the oil, the residual fruit is crushed in screw presses, care being taken to eliminate the seed as the latter contains a fatty oil with a bitter by-taste. The juice is then filtered like any fruit juice and, after the addition of yeast, fermented for a few days according to prevailing temperature. Previous to pumping the juice into the tanks, the latter have to be cleaned and sterilized with boiling water. The fermenting mass is kept at constant temperature by blowing air through it. For proper fermentation, the juice must contain a sufficient percentage of natural sugar, in other words it must originate from well-matured oranges, otherwise sugar has to be added. These orange wines are consumed locally as such, or used as admixtures to fancy lines like vermouth.

Orange Brandy

The orange wine may also be distilled. The crude alcoholic distillate usually contains some orange oil which could not be completely recovered by the preceding process of extracting the oil. In order to remove this oil, the first distillate (about 70 percent alcohol) is diluted to about 50 percent alcohol content, whereby it becomes cloudy with oil separation. After filtration through charcoal, the final product repre-

(*Turn to page* 125)

Study Shows Trends In Dehydration

U. S. Tariff Commission report reveals rate of rise in vegetable dehydration and indicates long-range expansion after an initial postwar decline

THE United States Tariff Commission predicts that a gradual long-range expansion of the vegetable dehydrating industry will follow an initial postwar decline. This expansion will come after experimentation has improved the products and after markets have been developed through advertising. A report by the Commission presents an interesting picture of the 4,000 percent expansion that took place in this field in the four years since 1940 and offers what are probably the most authoritative statistical data ever brought together on the subject. The portion of the report covering the period from 1940 to the end of 1943 is outlined here.

Unlike the dried milk and dried egg industries, which had substantial prewar commercial foundations on which to build, the dehydrated vegetable industry had almost reached the vanishing point by 1940. Only 15 plants remained from the 30 operating in 1919. Of a total output of 5,000,000 lb., about one-third consisted of vegetables intended for reconstitution; the other two-thirds was in powdered form for use as soups and flavorings.

As a result of the greatly complicated food supply problems created by the present war, the U. S. Army threw off its skepticism of the last war and enthusiastically cooperated in the development of a vegetable dehydration industry. Economy of shipping space and the saving in tin containers were the chief considerations. The number of plants rose from 15 in 1940 to 139 in October 1943, with 31 more being readied for operation before the end of 1943. In 1940 the industry was operating, almost exclusively, in California. By the end of 1943, there were 32 plants in California, 28 in the Pacific Northwest, 36 in the southern states and 74 in the North Central and Northeastern States.

Production Skyrockets

The output of dehydrated vegetables, in this country, increased from about 5,000,000 lb. in 1940 to 15,000,000 lb. in 1941, 36,000,000 lb. in 1942 and 115,000,000 lb. in 1943. The program for this year calls for 179,000,000 lb., not including soup powders. Nine vegetables were scheduled for dehydration this year, potatoes accounting for more than half the quantity. Sixteen percent of the carrot crop was to be processed, 12 percent of the onion crop and 61 percent of the garlic crop. Potatoes and sweetpotatoes dehydrated, however, amount to only 2 percent of the commercial crop.

Production facilities at the beginning of 1940 were totally inadequate to meet the war demand for dehydrated vegetables. Virtually a new industry had to be created, and the government embarked on a program to foster plant expansion. Food processors were persuaded to try dehydration. Some of them converted from canning when tin supplies were curtailed. Priorities were secured for material for plant construction. But the limiting factor turned out to be raw produce.

By far the major part of the capital for this expansion came from private sources. Out of a total of 160 plants operating early in 1944, only 32 had received government loans. The total of the loans extended amounted to $4,700,000, of which about half was for construction and equipment, the remaining half being for operating expenses. As the total investment in vegetable dehydrating plants was between $10,000,000 and $15,000,000, the portion supplied by government, for construction and equipment, was less than 20 percent. These loans are repayable on an amortization plan, paid as rent, at the annual rate of 22.5 percent of the loan. The loans contracted for running expenses are being repaid through government purchase of the finished product.

Sure to Survive

The great strides made in improving some of the dehydrated vegetables, together with the advantages offered in the distribution of dehydrated foods, makes the survival of many of these products practically a certainty.

Dried soups represent about the best immediate postwar prospect for the industry, and most of these manufacturers not only expect to continue operations but they plan to expand materially. Dehydrated vegetable powders for use as seasoning also should find a market, as should dehydrated potatoes, onions, beets and spinach for use in much the same way as the canned, frozen or fresh products.

The prices of dehydrated products will be an important factor in their development on the domestic market. The present costs, however, are not indicative of future costs since the industry is now operating under pressure where costs are a secondary consideration.

New Facts About Packaging And Storing Dehydrated Foods

By MEMBERS OF THE RESEARCH STAFF, Research Laboratories, Continental Can Co., Chicago, Ill.

Dehydrated rutabagas are a good source of vitamins C and B_1, and they have a mild but typical flavor when reconstituted. They retain most of their color and flavor for a year when stored at less than 80 deg. F.

PART X—DEHYDRATED RUTABAGAS

DEHYDRATED rutabagas make an acceptable food product when reconstituted, according to results of examinations through one year of storage. The flavor is mild but typical.

They are a good source of both ascorbic acid (vitamin C) and thiamine (vitamin B_1). When packaged in an atmosphere essentially free of oxygen, they will retain the greater portion of their initial color, flavor and ascorbic acid content for a period of a year, providing they are not stored at temperatures above 80 deg. F. The thiamine content is stable over the same period, regardless of the method of packaging or the storage temperature.

Storage Temperatures

High storage temperatures lower the quality of dehydrated rutabagas quite rapidly. For example, the product is unsatisfactory as a food after storage for 6 months at 98 deg. F., while storage at 130 deg. F. reduces its quality so quickly that it is barely edible after only one month.

Diced rutabagas for this experimental pack were secured from Farm Valley Foods, Inc., Osseo, Minn. They were a part of the April 26, 1943, commercial dehydration run at this plant and were shipped to our Chicago laboratory in hermetically sealed 5-gal. square cans. The product was repackaged and stored on May 3.

The rutabagas used were of the Yellow Swede variety grown in eastern Minnesota. They had been stored at a temperature of about 32 deg. F. for approximately 5 months after digging. The heads were prepared for drying by washing, cutting into segments and abrasive peeling. Following these operations, they were hand trimmed, cut into cubes ¼ in. on a side and then blanched in hot water. The product was dehydrated in a two-stage Proctor and Schwartz dehydrater in a total drying time of 4 hours. No finishing bins were used.

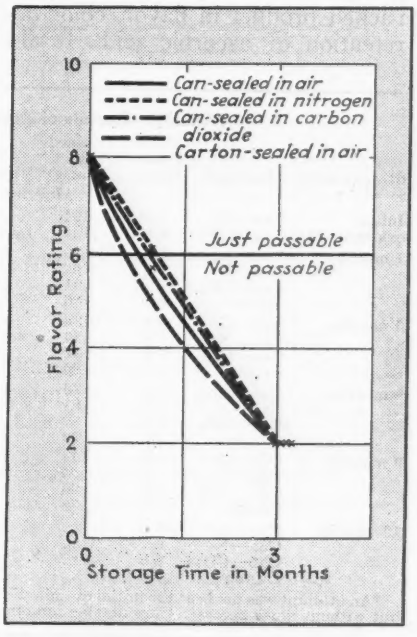


FIG. 3. Effect of storage time and packaging on flavor rating of dehydrated rutabagas stored at 130 deg. F.

Flavor tests were made on the reconstituted product prepared as boiled rutabagas according to the formula: 10 grams of dehydrated product were added to 150 c.c. of a 1 percent salt solution, allowed to soak for 30 minutes, then brought to a boil (requires about 15 minutes) and simmered for 25 minutes.

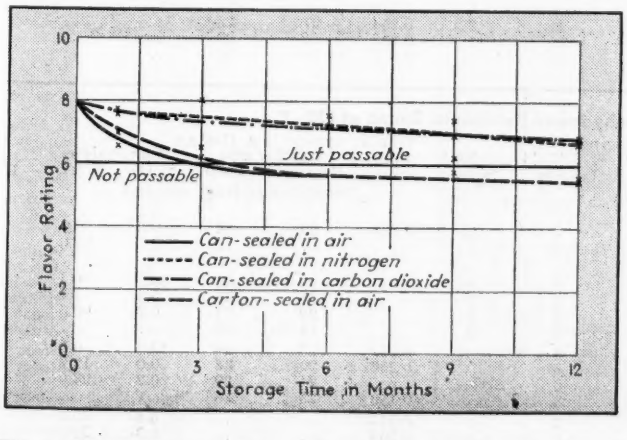


FIG. 1. Effect of storage time and packaging on flavor rating of dehydrated rutabagas stored at 75 to 80 deg. F.

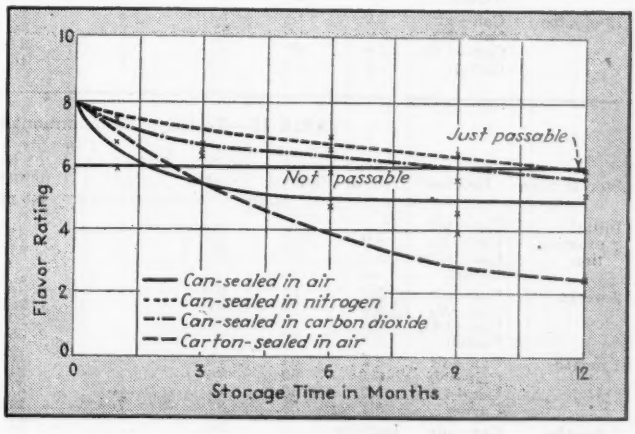


FIG. 2. Effect of storage time and packaging on flavor rating of dehydrated rutabagas stored at 98 deg. F.

pH determinations were made on the cooking liquor with the aid of a glass electrode.

Examinations of samples stored at 130 deg. F. were discontinued after three months because they had deteriorated so rapidly.

Summary of Results

1. *Effect of Packaging*—All examinations showed the gas-packed product to be superior to the air-packed product in flavor, color and retention of ascorbic acid. It also appeared to be better with respect to drained weight. There was no consistent difference between the product packed in cans sealed in nitrogen and that packed in cans sealed in CO_2; both were equally good. Also, there was no difference between the product packed in cans sealed in air and that packed in the paper containers except in the case of storage at 98 deg. F. and 93 percent relative humidity. In that case, the later examinations revealed appreciably greater deterioration of product in the paper containers. This accelerated deterioration was preceded by an increase in moisture content, indicating that moisture was absorbed by the product in these containers under these conditions.

2. *Effect of Storage Time and Temperature*—Storage at 130 deg. F. caused the dehydrated rutabagas to deteriorate quite rapidly. After one month at this temperature the product was judged to be below passing in flavor. Considerable blackening had also occurred in this time,

TABLE I—Results of Examinations of Dehydrated Rutabagas Stored at 75 to 80° F. (Room Temperature).

Storage time	Package	Flavor rating	Drained weight (grams)	Color (dry product) % N-1 (black)	% 5R4–14 (red)	% 5YR6–12 (orange)	% 5Y9–14 (yellow)	% N9.5 (white)	Vitamin content (mg. /100 gm.) Thiamine	Ascorbic acid Reduced	Ascorbic acid Total	Gas analyses % O_2	Gas analyses % CO_2	pH
			Moisture content of product—3.8 percent							Peroxidase activity—positive				
Initial examination	Can—N_2	8.0	101	58	..	35	5	2	0.238	69	83	0.5	0.0	..
	Can—CO_2	8.0	101	58	..	35	5	2	....	..	..	0.5	99.6	..
1 month	Can—air	6.5	79	63	..	29	3	5	0.251	49	73	...	...	..
	Can—N_2	7.8	89	59	..	36	3	2	0.237	56	74	...	...	..
	Can—CO_2	7.7	91	57	..	37	4	2	0.272	60	80	...	...	..
	Carton	6.9	86	62	..	30	3	5	0.271	48	61	...	...	..
3 months	Can—air	6.2	85	65	..	25	7	3	0.273	40	48	16.2	2.4	5.6
	Can—N_2	8.0	84	60	..	33	4	3	0.309	44	62	0.6	1.0	5.5
	Can—CO_2	7.4	87	56	..	37	5	2	0.278	49	60	0.4	99.0	5.6
	Carton	6.4	86	59	..	30	7	4	0.251	33	45	...	...	5.4
6 months	Can—air	5.7	76	66	..	26	6	2	0.245	28	41	9.1	3.0	..
	Can—N_2	7.6	81	60	2	31	5	2	0.253	55	61	0.3	1.5	..
	Can—CO_2	7.3	82	59	4	31	4	2	0.225	49	69	0.2	98.0	..
	Carton	5.7	79	65	..	29	5	1	0.260	29	40	...	...	..
9 months	Can—air	5.8	74	55	2	33	9	1	0.252	29	34	6.2	3.6	5.5
	Can—N_2	6.8	77	44	4	50	1	1	0.233	47	65	0.0	2.5	5.6
	Can—CO_2	7.4	80	52	1	45	1	1	0.224	51	62	0.0	98.0	5.9
	Carton	6.2	78	57	1	30	10	2	0.268	21	31	...	...	5.4
12 months	Can—air	5.6	..	56	4	21	14	5	0.265	22	34	...	...	..
	Can—N_2	6.7	..	50	8	32	5	5	0.231	38	62	...	...	..
	Can—CO_2	6.8	..	46	19	22	9	4	0.226	38	54	...	...	..
	Carton	5.5	..	55	5	23	12	5	0.233	22	36	...	...	..

*An attempt was made at the initial examination to mash the cooked product but without much success. Considerable lumpiness remained no matter what equipment was used for mashing.

TABLE II—Results of Examinations of Dehydrated Rutabagas Stored at 98° F.

Storage time	Package	Flavor rating	Drained weight (grams)	Color (dry product) % N-1 (black)	% 5R4–14 (red)	% 5YR6–12 (orange)	% 5Y9–14 (yellow)	% N9.5 (white)	Vitamin content (mg. /100 gm.) Thiamine	Ascorbic acid Reduced	Ascorbic acid Total	Gas analyses % O_2	Gas analyses % CO_2	pH
			Moisture content of product—3.8 percent							Peroxidase activity—positive				
Initial examination	Can—N_2	8.0	101	58	..	35	5	2	0.238	69	83	0.5	0.0	..
	Can—CO_2	8.0	101	58	..	35	5	2	....	..	..	0.5	99.6	..
1 month	Can—air	5.9	83	66	..	27	3	4	0.234	31	37	...	...	5.5
	Can—N_2	7.5	83	57	..	37	3	3	0.254	47	55	...	...	5.6
	Can—CO_2	7.6	86	60	..	36	2	2	0.215	43	50	...	...	5.6
	Carton	6.7	85	68	..	27	2	3	0.246	35	42	...	...	5.5
3 months	Can—air	6.4	73	66	1	23	7	3	0.277	15	21	14.8	5.9	5.3
	Can—N_2	6.3	72	63	5	24	6	2	0.258	38	42	0.6	3.8	5.4
	Can—CO_2	6.6	68	63	6	24	6	1	0.245	30	39	0.2	99.0	5.5
	Carton	6.3	71	71	1	23	3	2	0.296	20	27	...	...	5.4
6 months	Can—air	4.7	69	68	2	24	5	1	....	14	25	6.0	10.5	..
	Can—N_2	6.9	73	67	7	23	2	1	0.221	31	40	0.2	7.0	..
	Can—CO_2	6.6	73	67	7	23	2	1	....	18	23	0.3	98.9	..
	Carton	5.8	67	71	2	24	2	1	0.220	22	29	...	...	..
9 months	Can—air	4.5	40	66	1	31	1	1	0.273	17	29	5.0	15.2	5.2
	Can—N_2	6.3	56	63	6	28	2	1	0.230	14	43	0.5	7.3	5.4
	Can—CO_2	5.6	58	62	2	33	2	1	0.247	31	..	0.0	98.7	5.3
	Carton	3.9	50	70	2	25	2	1	0.258	14	30	...	...	5.0
12 months	Can—air	5.0	64	58	3	27	7	5	0.239	22	34	...	...	..
	Can—N_2	5.9	65	57	3	34	4	2	0.254	27	28	...	...	..
	Can—CO_2	5.8	67	61	3	34	1	1	0.245	22	29	...	...	..
	Carton	2.3	46	80	1	15	2	2	0.257	34	33	...	...	..

TABLE III—Results of Examinations of Dehydrated Rutabagas Stored at 130° F.

Storage time	Package	Flavor rating	Drained weight (grams)	Color (dry product) % N-1 (black)	% 5R4–14 (red)	% 5YR6–12 (orange)	% 5Y9–14 (yellow)	% N9.5 (white)	Vitamin content (mg. /100 gm.) Thiamine	Ascorbic acid Reduced	Ascorbic acid Total	Gas analyses % O_2	Gas analyses % CO_2	pH
			Moisture content of product—3.8 percent							Peroxidase activity—positive				
Initial examination	Can—air	..	...	..	..	..	..	..	....	..	..	...	...	..
	Can—N_2	8.0	101	58	..	35	5	2	0.238	69	83	0.5	0.0	..
	Can—CO_2	8.0	101	58	..	35	5	2	....	..	..	0.5	99.6	..
	Carton	..	...	..	..	..	..	..	....	..	..	..	....	..
2 weeks	Can—air	5.7	76	67	..	28	3	2	....	23	33	16.3	6.1	..
	Can—N_2	5.5	71	67	..	28	3	2	....	29	33	0.3	7.2	..
	Can—CO_2	6.0	73	67	..	29	3	1	....	28	31	0.7	96.5	..
	Carton	5.5	76	70	..	25	3	2	....	19	35	...	...	..
1 month	Can—air	5.7	61	78	..	17	5	..	0.252	23	28	13.6	9.6	5.3
	Can—N_2	6.1	69	73	..	21	6	..	0.239	29	32	0.0	12.7	5.3
	Can—CO_2	5.9	66	73	..	21	6	..	....	24	29	0.2	98.0	5.3
	Carton	5.1	55	83	..	14	3	..	0.189	25	28	...	...	4.9
3 months	Can—air	Inedible	...	79	..	17	2	2	0.245	..	..	3.8	32.4	..
	Can—N_2	Inedible	...	79	1	18	1	1	0.263	..	..	0.3	23.2	..
	Can—CO_2	Inedible	...	77	1	20	1	1	0.234	..	..	0.4	98.2	..
	Carton	Inedible	...	83	1	14	1	1	0.235	..	..	...	...	..

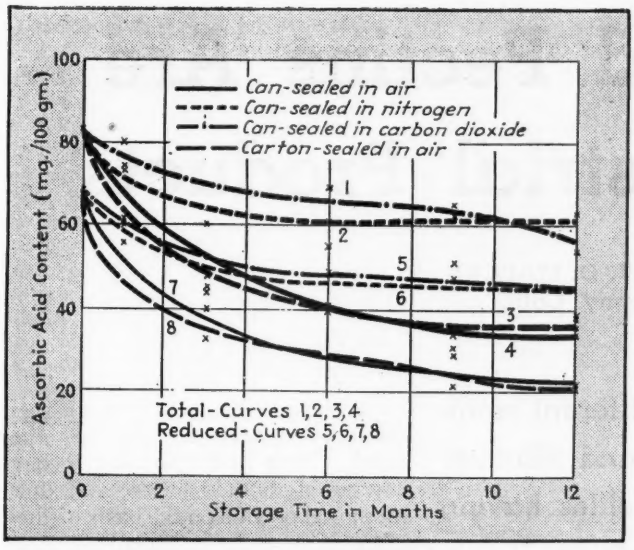


FIG. 4. Effect of storage time and packaging on the total and reduced ascorbic acid content of dehydrated rutabagas stored at 75 to 80 deg. F.

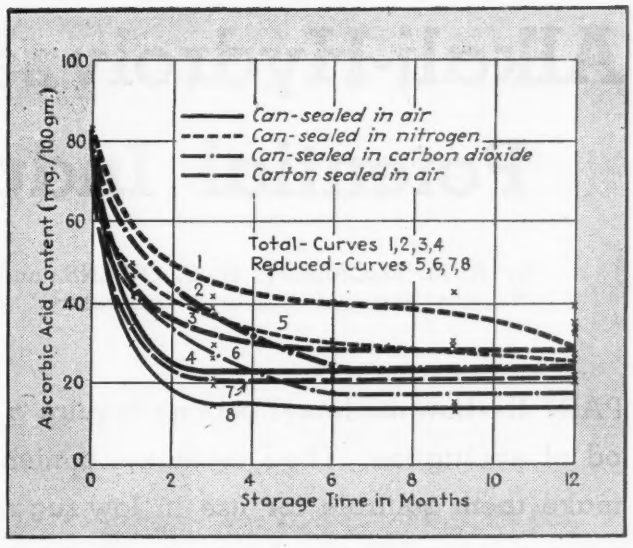


FIG. 5. Effect of storage time and packaging on the total and reduced ascorbic acid content of dehydrated rutabagas stored at 98 deg. F.

while about 35 percent of the initial amount of ascorbic acid was retained. After three months at this temperature, the product was inedible.

When stored at 98 deg. F., the loss in quality progressed somewhat more slowly but still fairly rapidly. After six months, even the gas-packed samples were considered to be barely passable in flavor and were no longer passable after nine months. However, the gas-packed product retained 50 percent of its initial ascorbic acid content over a six-month period.

At 75 to 80 deg. F., the gas-packed samples were fairly stable in flavor, color and vitamin content through one year. About 70 percent of the initial amount of ascorbic acid was retained over this period of time.

Oddly enough, the thiamine content of the product remained fairly constant over a three-month period at 130 deg. F. and through 12 months at 98 deg. F. and room temperature. This is in contrast to the gradual loss in thiamine found in the case of other dehydrated products stored at elevated temperatures.

At 130 deg. F., considerable amounts of CO_2 were given off by this product. For example, after three months of storage at this temperature, the air-packed can contained about 32 percent CO_2 and appreciable pressure was built up in the container. At the lower temperatures, lesser amounts were evolved, but almost 5 percent was found in the similar package stored for nine months at room temperature.

TABLE IV—Results of Periodic Weighings of Dehydrated Rutabagas in Paper Containers Stored at 98 Deg. F. and 93 Percent Relative Humidity.

Storage time	Number of samples weighed	Average percent increase in product weight over original*
Initial examination	24	...
1 month	24	0.37
3 months	22	0.46
6 months	20	0.87
12 months	15	0.95

*These figures are corrected for the weight of water absorbed by the paper in the container (4% increase in container weight in 5 days).

TABLE V—Results of Periodic Moisture Determinations on Dehydrated Rutabagas.

Storage time	Storage temperature (deg. F.)	Package	Moisture content (% of total weight)
Initial examination	..	..	3.8
1 month	98	Carton	4.4
3 months	98	Carton	3.6
6 months	98	Can—air	3.9
6 months	98	Can—N_2	4.3
6 months	98	Carton*	4.9
9 months	98	Can—air	4.3
9 months	98	Can—N_2	4.2
9 months	98	Carton*	5.1
9 months	75—80	Can—air	3.8
9 months	75—80	Can—N_2	4.0
9 months	75—80	Carton	4.0
12 months	98	Can—air	4.1
12 months	98	Can—N_2	3.9
12 months	98	Carton	5.5
12 months	75—80	Can—air	3.8
12 months	75—80	Can—N_2	3.8
12 months	75—80	Carton	4.0

*The paper packages stored at 98° F. were also subjected to a relative humidity of 93 percent.

Discussion of Results

The drained-weight values were surprisingly high. Data obtained on similar products indicate that dehydrated root vegetables, in general, reconstitute to appreciably less than their fresh weight. Ten grams of this product, however, resulted in a drained weight of 101 g. after reconstitution, although the moisture

(*Turn to page* 141)

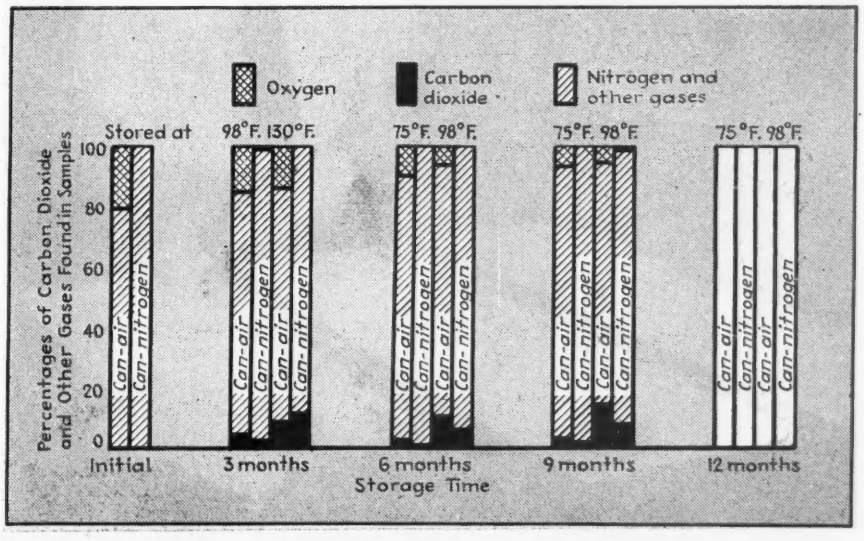


FIG. 6. Effect of storage time and temperature on evolution of CO_2 by dehydrated rutabagas packed in air and in nitrogen.

Alkali-Hydrolyzed Pectins Are Potential Industrial Products

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PART II—Low-methoxyl pectins require a different method of evaluation. Their methoxyl content and viscosity make them suitable for use in low-sugar jellies having the correct acidity and concentration of calcium ions

PECTIN QUALITY is evaluated in terms of "grade." The grade is the weight of sugar required for the formation of a standard jelly with one part of pectin. A standard jelly is one containing 65 percent of soluble solids and having a standard firmness and resiliency.

Low-methoxyl pectins cannot be evaluated in a like manner because of the many variable factors involved in this type of jelly formation. Low-sugar jellies probably can be prepared from almost any pectinic acid, provided the acidity and concentration of calcium ion are suitably adjusted. The properties of low-methoxyl pectins are determined primarily by their methoxyl content and viscosity, as a measure of chain length.

The importance of each of these factors has not always been recognized by investigators. Baker and Goodwin[13] and Hills, White and Baker[14] have compared low-methoxyl pectins on the basis of their methoxyl contents. On the other hand, Olsen and coworkers[15] have compared both pectins and low-methoxyl pectins on the basis of their viscosities and equivalent weights. Either the term "equivalent weight" or "methoxyl content" can be used, because the equivalent weight is a function of the free carboxyl groups. The equivalent-weight determination, however, is affected more by ash constituents. In like manner, only when the relationship of methoxyl to viscosity was taken into account were users able to predict gelling characteristics of these materials and to prepare jellies of high strength and good texture with milk and natural juices containing 35 percent or less of sugar.

Preliminary to drying, the press cake is washed with 50 percent alcohol, pressed and shredded, hardened in 95 percent alcohol and again pressed and shredded.

Evaluation

The properties of the low-methoxyl pectins as gelling agents with milk and in 35 percent sugar jellies served as a basis for their evaluation. The milk jellies were prepared as follows:

To a dry mixture of 20 g. of sugar and 0.5 g. of pectinic acid was added 100 ml. of whole milk with stirring. The mixture was then heated to boiling, cooled and gelled.

The 35 percent sugar jellies were prepared by adding 140 ml. of water containing 17 mg. of calcium ion per gram of pectinic acid to a dry mixture of 1.6 g. of the pectinic acid and 10 g. of sugar. The mixture was heated to boiling and 55 g. of sugar added slowly with stirring. The mixture was again brought to a boil, cooked to a weight of 200 g., poured rapidly with stirring into an 8-oz. jelly glass containing 1 ml. of standard jelly maker's citric acid (1 lb. to 1 pint of water), and set aside to cool and gel. The amount of pectinic acid, as well as of the calcium needed for jelly formation, varies with the relationship of methoxyl content to viscosity. In

*Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture.

Drying is carried out at 149 deg. F. under vacuum.

general, pectinic acids having methoxyl contents of 3 to 4 percent and viscosities of 6 to 10 centipoises need from 15 to 20 mg. of calcium per gram of pectinic acid for jelly formation under these conditions.

A number of devices have been used for evaluating jellies. Mechanical jelly testers measure only one quality, such as firmness or elasticity. They have not been found satisfactory in the evaluation of certain other qualities. The finger-test method, while admittedly not completely satisfactory, does offer a single means for a complete evaluation of firmness, resiliency and texture. In the hands of an experienced worker, duplicate results within 5 percent can easily be obtained. The method was used to evaluate the experimental jellies which were prepared with milk and with 35 percent sugar solids.

Table III contains data on the properties of some of the products and also observations on the characteristics of jellies formed from them. The pectins were prepared by various alkaline agents under different conditions of pH and temperature. While some jellies were 10 percent weak and also smooth, the pectins were considered satisfactory because, by increasing the pectin concentration by 10 percent or more, a jelly can be prepared having standard firmness. In cases where the jellies were weaker than 20 percent, the pectin was judged unsatisfactory because there is danger of undesirable texture or flavor if the pectin content is increased to a point where the jellies are of standard firmness. In sample 2, the methoxyl content was too low and the viscosity was too high for the correct calcium sensitivity. Precipitation of calcium pectinate in a granular form occurred. In samples 8 and 9 the methoxyl content was too high and the calcium sensitivity was not high enough to gel.

The advantage of using low-methoxyl pectins with calcium sensitivity in the range which will form jellies with natural products is the avoidance of the unpleasant "earthy" flavors which often result from the addition of calcium salts. Under suitable conditions of alkalinity and temperature, pectinic acids with methoxyl contents of near 2.8 percent and viscosities of approximately 6 centipoises were found to have calcium sensitivities similar to those having methoxyl contents of about 4 percent and viscosities of about 9 centipoises in 1 percent solutions. Both extremes were versatile in jelly formation, since they formed excellent jellies with milk containing 20 percent sugar at pH values near 6.5 and with fruit juice containing 35 percent sugar at pH values near 3. Pectinic acids having methoxyl contents lower than the examples mentioned generally are too sensitive toward calcium for the formation of jellies under the conditions indicated and will precipitate as a granular calcium salt. The sensitivity toward calcium of pectinic acids having methoxyl viscosity values higher than the examples given was found in most cases to be so low that a calcium salt addition was necessary for jelly formation.

Uses

Kaufman, *et al*,[16] and Hills, *et al*,[14] have given directions for the preparation of a number of jellied food products prepared with their low-methoxyl pectins. Since the pectinic acids described herein differ somewhat in gelling characteristics from those described in the references cited, directions for use in a number

Preparatory to use, the dried low-methoxyl pectins are ground in a hammer mill to pass an 80-mesh screen.

of products are presented. Of particular interest is a milk pudding which does not require heating. It can be prepared in 3 minutes and sets to a jelly of good texture in an additional 5 minutes.

Milk Pudding Desserts—Dry Mixes

1. Unheated.

A

Low-methoxyl pectin .....4 g.
Sugar .....4 g.

B

Sugar .....40 g.
Powdered milk .....50 g.
Salt ..... 1 g.
Flavor . . . Chocolate, vanilla, butterscotch or other nonacid flavor materials

To "A" add 2 cups of water and stir until the pectin is dissolved (requires 1 to 2 minutes). Add "B" and stir until milk has been completely dispersed, resulting in a smooth texture. Pour into molds and allow to stand for 5 minutes or longer. Chill if desired.

2. Cooked:

To 1 pint of milk add, with stirring, a dry mixture containing:

Low-methoxyl pectin ..... 2.25 g.
Sugar .....90.00 g.
Salt ..... 1.00 g.
Flavor (nonacid) .....as desired

Heat the mixture, while stirring, to a temperature of 185 to 190 deg. F., allow to cool to about 140 deg. F., pour into molds and allow to gel.

TABLE III—Gelling Characteristics of Some Low-methoxyl Pectins.*

No.	Methoxyl (per cent)	Viscosity (centipoises)	Characteristics of gels: Milk	35% sugar	Remarks
1	2.7	6.3	10% weak, smooth	10% weak, smooth	Satisfactory
2	2.7	9.0	10% weak, grainy	20% firm, grainy	Unsatisfactory
3	3.2	10.0	Firm, smooth	5% weak, smooth	Satisfactory
4	3.3	5.3	10% weak, smooth	30% weak, smooth	Unsatisfactory
5	3.6	8.6	Firm, smooth	10% weak, smooth	Satisfactory
6	3.7	10.3	Firm, smooth	20% weak, grainy	Satisfactory
7**	3.8	9.1	10% weak, smooth	Firm, smooth	Satisfactory
8	4.4	9.3	10% weak, smooth	30% weak, smooth	Unsatisfactory
9	4.7	6.2	10% weak, smooth	30% weak, smooth	Unsatisfactory

*Different conditions of pH, time, and temperature were used in the preparation of the samples.

**A 4 percent pectin solution was used for this sample.

Gelled Pie Fillings

To 70 parts by weight of cherries, berries or other fruit add a dry mixture of 0.5 part of low-methoxyl pectin, 30 parts of sugar and 0.5 part of citric acid. Bring the mixture to a boil, cool, dispense into pie shells and bake in the usual manner.

Gelled Fruit Juice

To 150 parts by weight of fruit juice add a mixture of 1.5 parts of low-methoxyl pectin and 10 parts of sugar. Bring mixture to a boil with stirring, then add 50 parts of sugar. Heat again to boiling and pour into 8-oz. jelly glasses, each containing 1.0 ml. of standard jelly maker's citric acid. Stir vigorously and allow to cool. The citric acid may be added with the sugar if desired.

Gelled Tomato Salad

To 100 g. of tomato juice add a dry mixture of the following:

Low-methoxyl pectin .....0.750 g.
Monocalcium phosphate $Ca(H_2PO_4)_2$ .....0.075 g.
Citric acid .....0.500 g.
Sugar .....5.000 g.
Salt .....1.000 g.
Spices to flavor

Heat the mixture to boiling with stirring, pour into molds and allow to cool.

Gelled Fruit Salad

To 60 g. of diced fruit add 40 g. of a sirup containing:

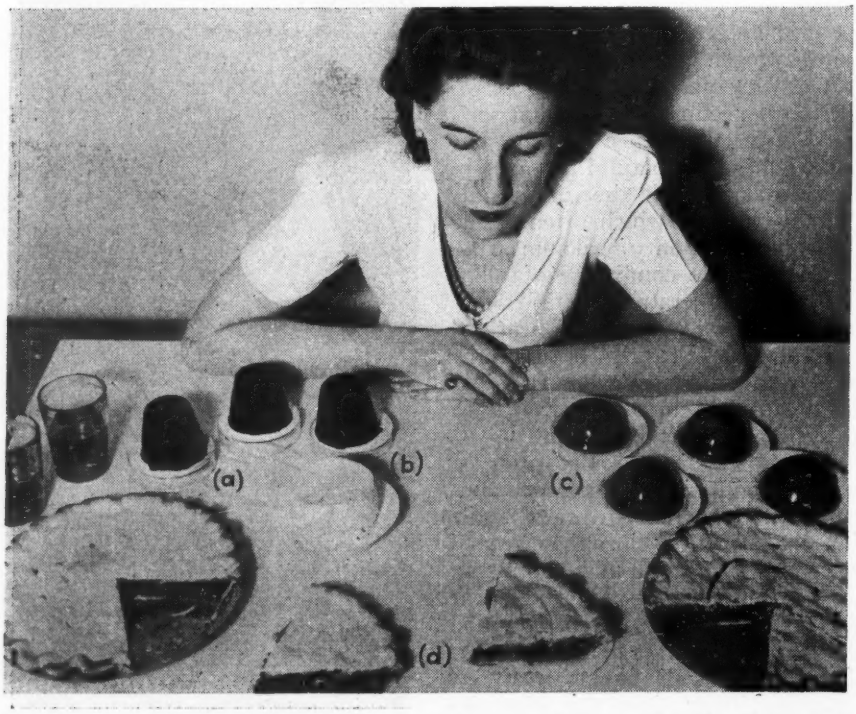
Low-methoxyl pectin ..... 0.750 g.
Monocalcium phosphate ... 0.075 g.
Sugar .....35.000 g.
Citric acid ..... 0.500 g.
Water .....63.600 g.

Thoroughly blend a dry mixture of the low-methoxyl pectin, calcium phosphate and one-fifth of the sugar. Sift this mixture into the water, with stirring. Bring to a boil and slowly add a mixture composed of the remaining sugar and the citric acid. Bring the sirup again to a boil and pour into molds containing the fruit.

Dry Mix for Jelly

Low-methoxyl pectin ..... 3.750 g.
Monocalcium phosphate ... 0.375 g.
Sugar .....75.000 g.
Citric acid ..... 0.500 g.
Flavor and color as desired

Add the dry mix to a pint of water or equivalent in parts by weight, bring to a boil, pour into molds and allow to cool. Refrigeration (unless desired) is not necessary, since gelation will take place at room temperature.



Experimental use of low-methoxyl pectins include preparation of: (a) artificially flavored 15 percent sugar dessert or salad jellies and 35 percent sugar fruit juice jellies, (b) vanilla-flavored milk pudding, (c) tomato juice salad jellies, and (d) fruit pies.

Acknowledgment

The authors acknowledge the general assistance of Ruth Frenchman, J. G. Supple and Dorothy W. Smith of this laboratory.

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EDITORIALS

LAURENCE V. BURTON, Editor

Things To Watch

IF your job is management, there are several matters to be followed closely to insure that decisions are based on adequate information.

Pantry Stocks—How much nonperishable food is in the pantries of America? Is it above or below normal? How far?

Victory Foods—How much home-processed food from Victory Gardens is in America's pantries? Are people likely to continue their food efforts after V-E day?

Cotton Situation — Full parity price for cotton would normally make a good food market in cotton states.

Action by Great Britain—Britain has been in the process of contracting for the entire exportable surplus of food from some countries for several years ahead.

Wage Changes—If wage rates go up, the rate is not so important as the actual earnings the workers take home. Rates may go up and yet earnings may decline.

Reconversion Plans — If makers of war materials do not move fast after V-E day, there will be a sudden drop in workers' buying power.

Tax Policy Toward Cooperatives —With cooperatives, especially farm cooperatives, tax-exempt and with corporations paying income taxes in the high brackets, the cooperative is likely to have the larger cash reserves and act accordingly.

End of War in Europe—You are on your own when it comes to guesses on V-E day. Most important to food manufacturers, however, is how accurately the converted nonfood manufacturer judges future events. If he gets back to civilian production in short order, markets will be good.

Ben Lichtenberg

ONE of the foremost public relations specialists in America, Ben Lichtenberg, died recently. A diminutive little man, who smoked enormous cigars, he had a tremendous grasp of the problem of public relations of the food processor. He was adviser to some of the largest food processing companies in the country.

Believing that the biggest public relations problem of the food industry was its relation with the farmer, he always counselled informing farmers about the costs incurred between buying the products of the farm and their sale in processed form to the public. For he believed that the farmer was a reasonable person if he could actually learn the facts. May his good work continue.

A Job for G.I. Joe

ANY day now G.I. Joe will apply for a job. We want to give it to him. We must get ready now so that we may know the jobs on which we would like him to work for us.

Three steps need to be taken in finding and filling these jobs with veterans which are a little different than the ordinary personnel task.

First, we must take care of the returning veterans who left our own service to go in the Army, Navy or Marine Corps.

Second, we must make a fair but critical appraisal of the abnormal psychology which Mr. Joe may have acquired while in the service. For his sake, as well as ours, we must be tolerant, we must identify nervous distortions to protect him individually from undue strain or even from accident.

Third, we must help each ex-service applicant to take advantage of the government training programs which are to better fit him to take up well-paid jobs with a future. It will be no favor to the veteran to put him to work too soon. He must be assisted to get that training, even extended schooling, which will best prepare him to earn a living.

Every employer will accept these responsibilities as part of his natural duty in the period of readjustment. Calm and thoughful appraisal of them now may save a lot of strain and difficulty later.

The Riddle of High Wages

THE intellectual processes of the labor-statistician or labor-economist are not known to many. Even labor leaders lack understanding of the conclusions reached by the statisticians—witness George Meaney, Secretary of AF of L, in his arguments before the War Labor Board in which he hotly contends that because of certain price changes the wage scales of his union members should be increased.

Newspapers have carried much wordage of late about the effort to break the Little Steel formula. This formula was the basis of the 15 percent increase in wages because the cost-of-living index has risen a like amount. The President ordered everybody to hold the line, and yet we all know that a large sector of the working population has been getting big wages, in fact, bigger wages than they ever saw before.

Total weekly earnings (wages) in January, 1941, were $255,000,000.

Total weekly earnings in April, 1944, were $644,000,000.

The figures were given to us by a labor executive, with the following breakdown of the tremendous increase in earnings.

42.8 percent is due to increased employment (more people at work)
14.7 percent is due to longer hours at straight-time rates.
6.1 percent is due to overtime earnings.
7.5 percent is due to changes to higher paid jobs.
13.6 percent is due to increases in piece rates.
15.3 percent is due to general wage rate increases.

If we follow his contention correctly, only 15.3 percent of the increased earnings are due to wartime wage-rate increases. The point he made is that an increase in the wage *rate* does not, in itself, constitute an inflationary threat. When the war ends, 85 percent of the weekly earnings of labor will disappear, assuming that wartime employment and hours revert to early 1941 levels. When overtime rates are no longer paid, because the average 48-hour week will be reduced to 40 hours, the reduction in earnings will be about 17 percent. Organized labor contends that this would justify a 22 percent increase in wage rates all along the line to maintain present weekly earnings.

Both CIO and AF of L agree that present-day earnings should be continued if the country is to avoid a business recession after the war

ends. It is interesting to note that Chester Bowles also has pointed out that a reduction of the work-week from 48 to 40 hours will reduce the annual take-home earnings of the wage earners by $14,000,000,000. This huge sum, he says, will be money that the merchants and manufacturers will never get because it will not be in the hands of the spenders.

Business men who have never before given much thought to political economy—the economy of the entire nation—are beginning to see eye to eye with the economists of the labor groups. Heretofore, the tendency of business has been to look only at wages as a cost item. Today, the tendency is to look at wages in two ways: cost, and—what is just as important—consumer buying power. In the minds of management, high wages are beginning to mean big markets. If the idea takes hold generally, the industrial millennium soon will be here.

The only fly in the ointment comes from the belief of one of the smartest chaps in Washington that the present level of business can be maintained after the war for several years—without deficit spending—*provided* we can have export trade to the extent of $6 or $7,000,000,000 a year. The latter, however, will require an improved international credit system and a revised internal tax system.

The idea is gradually gaining ground that the postwar years carry a great deal of promise through the mutual education of organized labor and management in the topmost ranks. Let us hope that the same understanding percolates downward through the lower ranks.

Where Does Housekeeping Stop?

Many plant managers pride themselves on their modern food plants. Walls are gleaming, floors are spick and span, machinery is washed and polished daily.

But where does the food product go when it leaves the production line? Is the warehouse company controlled and maintained? Is it as clean as the plant?

A number of recent items in *Notices of Judgment under the Federal Food, Drug and Cosmetic Act* have indicated that all warehouses are not as well taken care of as they should be. Several notices describe seizures of hundreds of cases of dried fruits, and report that "the room of the warehouse in which this product was stored was infested with weevils."

The answer to this problem is closer cooperation between production executives and the warehouse and distribution departments. To make the finest product in the world under the most sanitary conditions, and then to store this product in a dirty warehouse, is a criminal waste of food—and a waste of money.

Opportunity for Freezers

A COMMENDABLE activity of the United Fresh Fruit and Vegetable Association is the appointment of a committee, headed by John N. Kelley of United Fruit Co., to study refrigerator cars and rail transportation of fruit and vegetables. Many of the existing 140,000 refrigerator cars must be replaced in the near future, for reefer building has been practically stopped for several years.

Members of UFF&VE have pretty clear ideas of what they want in dimensions, interior arrangements and performance. The railroads and private car lines show every sign of cooperating with the shipper's program. Action seems to be forthcoming within a reasonable time to produce a new series of all-purpose refrigerator cars.

But we believe the UFF&VE should invite the frozen food manufacturers and shippers to participate in the program of planning the new cars. Freezers have not had the optimum sort of rail transportation they have needed. Whether an all-purpose reefer can maintain stable temperatures below freezing, as well as above, should be thoroughly explored by a joint technical committee before the new reefer car designs are definitely settled.

Admittedly, the problem of close temperature control becomes more difficult at below-freezing temperatures, especially on a moving railroad car, but a very great economy to distributors of both fresh and frozen foods, as well as to the railroads, could be effected if a single type of car could serve all needs.

This is an opportunity for freezers to do themselves a great service by cooperating with UFF&VE.

New Food Kettle Designs Are Possible

WHY not utilize some of the high-temperature heat-transfer fluids like Dow-Therm for heating cooking and evaporating kettles? If these new substances for high-temperature, low-pressure heating are practicable for food plants, there is no occasion to cling to the orthodox design of a steam-jacketed kettle which has its present shape largely to be able to hold high pressure in the jacket. If low-pressure heating is practicable, it would appear that the kettle of the future could have a trough shape without involving any hazards. In fact, it appears that continuous atmospheric evaporation could be made a simple reality by feeding the liquid into one end of a long trough evaporator and drawing the concentrate off at the other.

There is really no special novelty in the idea for it has been employed for years in principle. The semi-industrial type of sirup evaporator heated by a wood fire is old stuff. What the synthetic heat transfer media contribute is ability to control temperatures closely.

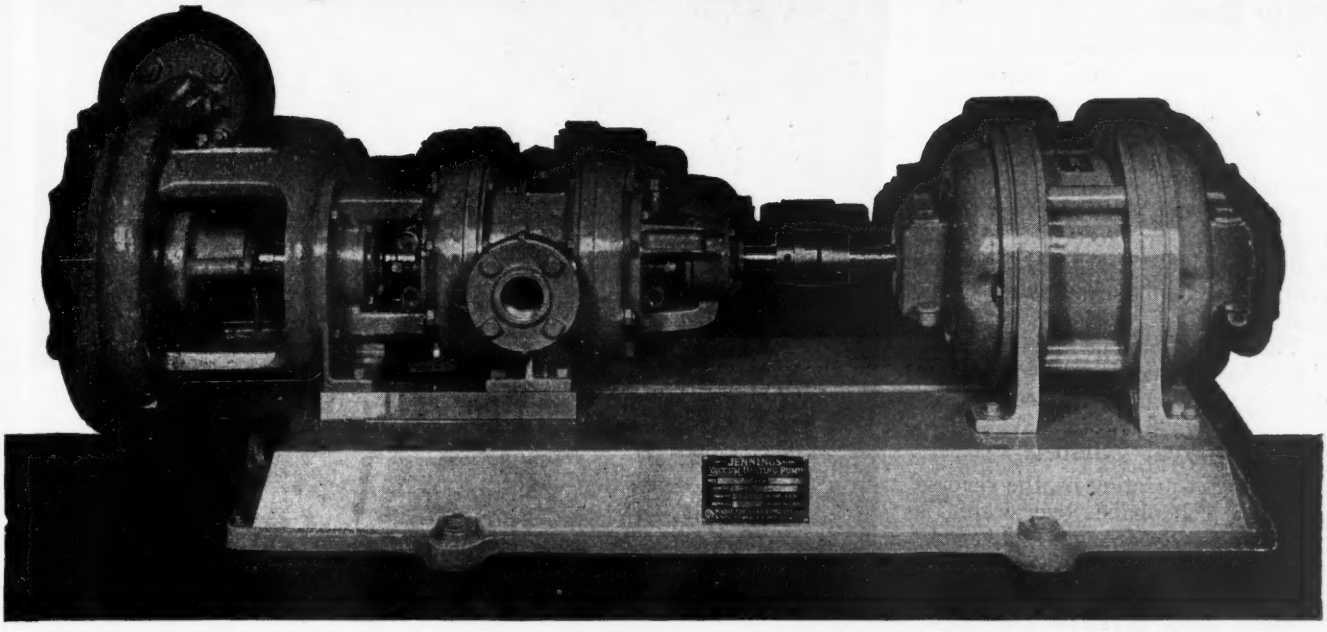
Broad Research Pays

Two outstanding developments recently reported in Washington, illustrate the way in which broad studies of food technology may afford greater benefit to the food processor than even intensive work on the main product alone.

One of the developments promises to make for the Sunkist interests of California a very profitable dried ground meal for cattle feed based on citrus peel, rag and other wastes. Some good chemical engineering equipment is already converting these byproducts of juice and slice processing into a marketable feedstuff of such value that the return for the byproduct may approach the income from the main products.

Perhaps an equally interesting future possibility, though not yet proven commercially, is the proposal for making vitamin C from citrus wastes.

Nash—the Perfected Vacuum Pump for Evaporators and Condensers

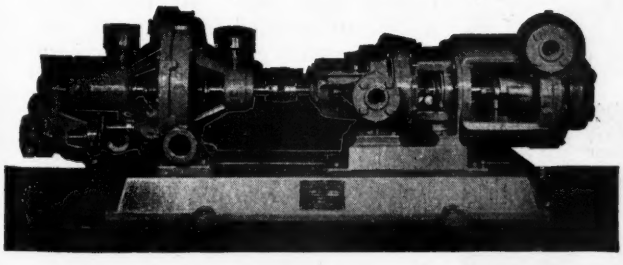


COMBINATION VACUUM REMOVAL UNIT ESPECIALLY DESIGNED FOR SATISFACTORY OPERATION ON CONDENSERS WITHOUT BAROMETRIC LEG

Especially designed for drawing air and liquid from high vacuums, the Nash Vacuum Removal Unit is an efficient combination of a standard Nash Vacuum Pump and a Jennings Centrifugal. This design may be had in either motor or steam turbine drive, and may be installed with confidence that it will operate perfectly.

Nash Vacuum Pumps for Evaporator and Condenser Service offer unusual advantages. Vacuum is non-pulsating, producing uniform operating conditions and assuring a better product. Nash Vacuum Pumps have no valves, gears, pistons, rings, or mechanical complications. The single moving element rotates without metallic contact, and no internal lubrication is required. In standard design these pumps maintain vacuums up to 27" of mercury.

Nash Pumps are compact, and require but a fraction of the space taken by old type equipment. They may be installed where convenient, and they operate at suitable speeds for direct connection to either electric motors or steam turbines. Nash engineers will be glad to recommend proper equipment to exactly meet your particular requirements.



THE NASH VACUUM REMOVAL UNIT MAY BE HAD EQUIPPED WITH STEAM TURBINE DRIVE WHERE THIS TYPE IS PREFERRED

NASH ENGINEERING COMPANY

SOUTH NORWALK · CONNECTICUT, U. S. A.

NEW PACKAGES & PRODUCTS

Party Dress

A NEW carton has been adopted by U. S. Cookies, Inc., Brooklyn, N. Y., for its cookie assortment known as Party Bits.

A photograph of the cookies in natural colors covers the upper two-thirds of the label, with a band of light orange below. White and light blue are used for accent. A cellophane overwrap adds sparkle.

The carton can be used unlined, the cookies being placed two or three deep in red waxed paper cups.

Wraps That Glisten

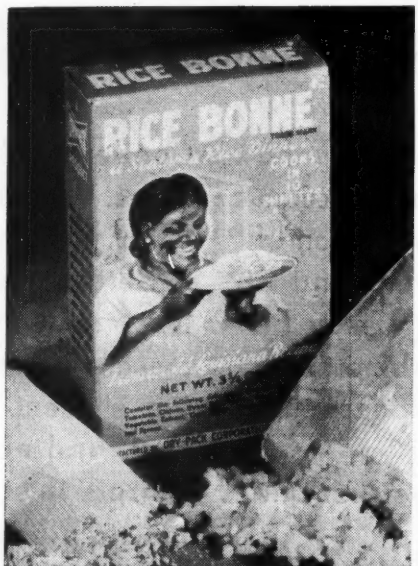
FULL-COLOR printing on the reverse side of cellophane overwraps is used effectively on new retail packages for Cascade Frozen Foods, Inc., Seattle, Wash.

Each label pictures the product as a background design, so that the package has all the quick recognition value of complete transparency, while still permitting the use of a sturdy carton for the mechanical protection of the frozen food. The overwrap is heat sealed.

The new trademark, Agen Quick Freeze, appears on a white oval on the face of the package. Plain color bands carry the product name and the necessary weight data.

Southern Rice

DEHYDRATED RICE that cooks in 10 minutes forms the base for Rice Bonné, manufactured by Dry-Pack Corp., New York. The rice is packed in a waxed paper bag, within which is a small envelope containing the rest of the sauce ingredients, dehydrated tomatoes, onions, sweet bell peppers, granulated vegetable extract, cornstarch, oatmeal, sugar, salt and spices. Canned or fresh tomatoes are to be added in cooking.



The outer carton has the red background used by this manufacturer, with a picture of a negro cook smiling over a dish of the rice dinner. Lettering is in yellow and white.

Mussels in Tin

CANNED sea mussels are among the less well-known seafoods now being widely distributed as a result of government efforts to replace products unavailable on account of war conditions. These are processed with only salt and water added, to be used in the same way as oysters or clams. The problem of getting rid of troublesome sand has been solved by the packers.

Activity in canning mussels centers in New England. Among the brands now on the market is a 10½-oz. net weight tall tin offered under its own label by Cresca Co., New York.

Cheese on the Counter

ANTICIPATING an increase in self-service selling, Borden Cheese Co. has redesigned the packaging for their process cheeses in the half-pound size.

For easier identification the Borden's trademark and the cheese

type, American, Swiss, Limburger or pimento, appear on all five faces of the cover. (A "cheese quiz" question and answer is printed on the bottom.) The lettering has been restyled for legibility, and characteristic colors are used for each kind of cheese, to reinforce the recognition value.

The overall outside wrapper, formerly used on a one-piece folding carton, is being eliminated because of its tendency to tear. The new carton is in two pieces, with a simple folding base and a slipover cover. This construction permits heat sealing of the inside cellophane wrap, for better protection of the cheese.

Smoked Fish Canned

SHAD, smoked and processed by the Perfection Smokery, Inc., Seattle, Washington, is being distributed exclusively under the White Rose label of Seeman Brothers, Inc., New York.

The product gives evidence of meticulous attention to detail in handling and packing. The fish is lightly smoked and solidly packed, 15½ oz. net weight in a 1-lb. flat salmon-type can.

Popovers

WITH only four ingredients, wheat flour, dried whole egg, salt and baking powder, Puff-over popover mix is the result of careful selection and blending. It is packed by C. S. Frost, Palisades, N. Y.

PUFF-OVER
For delicious popovers just add milk and bake for 30 minutes.
SERVE AT BREAKFAST LUNCH and DINNER
Packed by C. S. FROST
PALISADES, N. Y.

The mix is now sold in an 8-oz. spiral-wound paper container with a slipover cover. A simple tan and brown label is carried up to the top of the package, in order to seal on the cover without an extra labeling operation. A new type package and redesigned label are planned for future production.

Mushroom and Noodles

IN addition to powdered dehydrated mushrooms, dried onions, vegetable protein derivative, spices and salt, a new soup mix contains "egg barley," made of egg yolks, flour and water. It is packed by Weiss Noodle Co., Cleveland, under the name of Mrs. Weiss' Home Style Mushroom Soup, in a cellophane heat-sealed bag, net contents 2½ oz., protected by a small folding carton rigid enough to stand on the shelf or counter.

Take the $$$$$$$ out of $tone$

• Now, with critical war shortage of labor, streamline STONING in your mill. Removing stones has always been slow, laborious and costly out of proportion to other steps in processing cereals, soy beans, and other dry foods. To eliminate this great headache of the cereal and other dry food processors, we have developed a new type stoner—revolutionary in design, amazing in efficiency, low in first cost, in operation. Removes stones, glass, non-magnetic metals, and all other hard, dangerous contaminations from cereals, soybeans, and other beans, and other food products, with, 1) an action so sensitive the tiniest particles are easily removed; and 2) operating cost so low it is relatively insignificant; and 3) 99.9% efficiency. Capacity up to 16 tons per hour. **Write for Bulletin FI-1144.**

SUTTON, STEELE & STEELE, Inc.
DALLAS, TEXAS
In Canada—Kip Kelly, Ltd., 68 Higgins Ave., Winnipeg
Foreign — Separations Engineering, Ltd., 133 Bush House, Aldwych, London

As important as ammunition!

AN old line sergeant now in Italy told a war correspondent he spent a lot of time making sure rifles were properly cleaned and cared for in a training camp . . . but never had to worry about that at the front!

When a man's life depends on his rifle . . . he keeps it cleaned and oiled. That's why this container for rifle oil was designed to fit a pocket of the standard cartridge belt. A fighting man wants it with him all the time.

The American Oil & Supply Co. of Newark, New Jersey, packages its lubricating and preservative oil for the Ordnance Department in this container . . . made by Crown. It's not a highly decorative can . . . it's designed for concealment rather than display. But it is sturdily built to stand front line conditions—and that is where it goes!

Another example of how the Crown organization is doing a war production job that is a direct contribution to the success of American arms!

CROWN CAN

CROWN CAN COMPANY
NEW YORK • PHILADELPHIA
Division of Crown Cork & Seal Company
BALTIMORE, MD.

FOOD INDUSTRY NEWS

THE PROCESSING PICTURE

Meat Packers Report Advances Made Through Heavy Wartime Production

Poor design and high maintenance cost of obsolete equipment is also discussed at meeting of Institute

TAKING stock of the present and potential postwar status of the meat-packing industry characterized the 39th annual meeting of the American Meat Institute held at the Drake Hotel, Chicago, September 26-28th. Particular emphasis was placed on experience gained from current wartime operations which can be applied to peacetime to keep production costs low and to raise and maintain product quality.

A highlight of the meeting was the announcement that the board of directors had appropriated $500,000 to provide for increased scientific research facilities.

Howard C. Greer, vice-president, Kingan & Co., Indianapolis, Ind., cited experiences gained in: (1) personnel relations, (2) equipment design and replacement, (3) product items and quality, (4) service curtailment, and (5) sales promotion which lend themselves to continued application during the postwar period.

Equipment Obsolete

Wartime operations have shown much existing equipment to be obsolete, poorly designed and not constructed to give satisfactory performance without excessive maintenance expense. They have also shown the need for more sturdy units, for more labor-saving mechanisms such as chutes, conveyors and power driven trucks, for greater standardization in design and to make similar parts in different-make machines interchangable, for more automatic machines and more continuous processing units such as the elevator-type smokehouse. Higher depreciation rates to encourage replacement were also advocated.

Meeting the specifications imposed by government agencies has shown benefits that can be had through moisture and fat control, increase in yields, standardization of grades, elimination of overlapping or conflicting items and uniformity of packaging procedure, all accompanied by increase in product quality.

Present-day truck operations show direct delivery expense to be 50 percent greater than before the war because of the greater number of breakdowns and higher paid drivers. Indirectly, that cost has been equalized by increased loads, fewer stops and elimination of extra services.

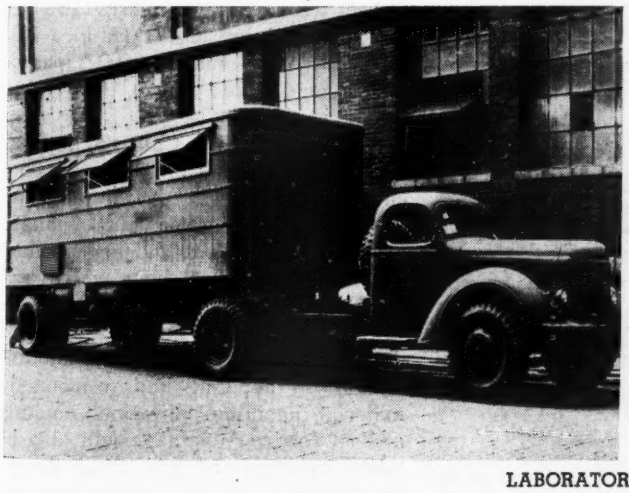
Sales promotion during the war period has indicated benefits to be gained through continuous and progressive improvement in product quality. These benefits may be had through improved keeping qualities of the various meat industry products obtainable by increased use of refrigeration, moisture-retaining wrappers and antioxidants, by the upgrading of products, with elimination of the lesser desired items, and by improved methods of making such products as lard so that they can be sold for what they really are.

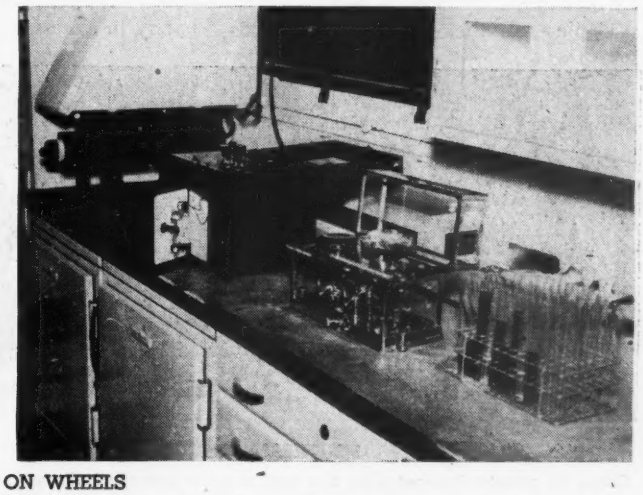
Meat Supplies

H. E. Reed, chairman of the War Meat Board, gave 12,400,000,000 lb. (carcass-weight basis) as the tonnage of meat of all kinds that is in sight for consumption during the period of July 1 to December 31, 1944. Of that quantity, 9,100,000,000 lb. is Federally inspected and is allocated: 2,600,000,000 lb. to the armed services, 1,300,000,000 lb. for purchase by the Office of Distribution for Lend-Lease, Red Cross and similar war agencies, 58,000,000 lb. for commercial exports and the remaining 5,142,000,000 lb. for U. S. civilian consumption. That quantity of Federally inspected meat added to 3,200,000,000 lb. of non-Federally inspected meat gives a total of 8,342,000,000 lb. or approximately 130 lb. per capita at an annual rate.

New Answers Found for Sweet Potato Problem

SINCE the series of three articles on "Freezing Provides an Answer to Sweet Potato Problem" was concluded in the September issue of FOOD INDUSTRIES, one of the authors, J. G.





LABORATORY ON WHEELS

The ten-ton Army type trailer-truck on the left is the Quartermaster Corps' mobile chemical and bacteriological laboratory. It is equipped with the finest and most scientific devices for testing and analyzing food products. The interior view, on the right, shows a vacuum drying oven, for determining the moisture of the food products, a Beckmann pH meter to test acidity, scales and test tubes.

Woodruff, reports that he made pies from sweet potato puree that had been held for 8 months at 0 to —5 deg. F. The results are summarized as: (1) The fresh sweet potato flavor and aroma remained unchanged. (2) With sugar added in the ratio of 4 plus 1 at the time it was prepared, tasted sweeter, and had slightly less "body," possibly due to conversion of sucrose to invert sugar. (3) Pies made from sweet potatoes that were lye peeled and cooked under steam pressure were superior in flavor and aroma to those from potatoes that had been either baked or boiled before making puree. (4) There was no difference in pies made from small, medium or jumbo potatoes.

Sweet potato pies from frozen puree that were baked, enclosed in latex bags, held at 0 to —5 deg. F. for six months, and thawed, were softer and slightly more moist, but their flavor and aroma were unimpaired. The pastry was rather mealy and crumbly.

It was found, moreover, that by using a standard machine, commonly used for the preparation of tomato puree, an excellent product can be prepared from unpeeled, precooked sweet potatoes. In this way the yield is increased from about 70 percent to more than 85 percent of the total products used. "The product seems to have more color," Mr. Woodruff declares, "and the color is practically the same after the prescribed 0.2 percent citric acid is added."

Swiss Cheese Standards

TENTATIVE U. S. standards for six grades of Swiss cheese have been issued by WFA, effective October 15. The standards are basically similar to the present state grades of Wisconsin, where two-thirds of U.S.-produced Swiss cheese is manufactured.

Copies of the tentative standards may be obtained from the Dairy and Poultry Branch, Office of Distribution, War Food Administration, Washington 25, D. C.

Food Plant Safety Is Discussed at Congress

THE prevention of skin disorders in the food industry is very simple, according to Dr. Louis Schwartz, who spoke before the food section of the National Safety Congress, held recently in Chicago. It consists, he said, of having food handlers wear rubber gloves, sturdy sleeves fastened over the gloves at the wrists, and sturdy aprons. This also protects food from contamination, he pointed out.

D. R. Blenis, safety director of the Madison packing plant of Oscar Mayer & Co., told how a new employee is examined by the employment manager and the plant physician to make sure that he is both mentally and physically fitted for the work to be given him.

Master Brewers Plan Postwar Adjustments

ADJUSTMENT of processing methods to wartime requirements and postwar planning were the key notes of discussion at the third wartime conference of Master Brewers' Association of America, October 12-14, in St. Louis.

During the first technical session it was pointed out that malt adjuncts—including yellow corn, raw barley, processed or as whole grain, wheat, and wheat derivatives, soybean flakes, and grain sorghums in various form—are being used in quantities ranging from 10 to 40 percent, most of them successfully, without producing significant changes in the taste of the finished beer. Alterations were required, however, in the process.

For brewers who have kettle capacity in excess of malt-grinding facilities, a new type of product, malt wort concentrate, is expected to be helpful, as it can be added directly to the wort in the kettle. In spite of the serious hop shortage, hop extracts and hop concentrates are not looked upon with great favor. Suggestions for synthetic hop flavors are rejected emphatically.

Much interest was centered around the comparative value of mash filters versus mash-lauter tub systems. Mash filters have given good performance, especially in big breweries where it is essential to handle large volumes in a relatively short time.

Important Development

Probably the latest and most important technological development in the brewing process is wort filtration before fermentation. The wort may be filtered either hot or immediately after cooling. In the former case, a quick removal of the hops is achieved, although a large proportion of the so-called cold sludge is retained in the wort. In the latter procedure, both the hot and cold sludge are removed from the wort, which remains in contact with the hops for a longer period of time.

Standardization in trade packages for draught as well as for bottle beer is being discussed by brewers and manufacturers in order to facilitate cleaning operations. After the war, a shift from wood to metal barrels is seen, especially a large increase in aluminum barrels as soon as this critical metal can be procured. Cork substitutes for bottle crowns are not yet satisfactory.

Pasteurization may undergo more radical changes than other phases of the brewing process. New developments in asceptic packaging, flash pasteurization, the possibility of applying dielectric heat and similar treatments are being followed closely.

The results of recent vitamin assays of beer were given (in micrograms per 100 ml. of beer) as: thiamine, 1.0; riboflavin, 26; niacin, 600; pantothenic acid, 120; biotin, 0.75; and folic acid, 30.

F. P. Siebel, Jr., Chicago, pointed out that tomorrow's brewery will be a curious combination of the old and the new, since the fundamental changes from raw material to finished product are based on natural laws which will not be altered. However, the steps of converting one into the other will undergo more or less profound modifications, by applying improvements in material handling, filtration, cooling, and so forth. Advantage will also be taken of improved functional design of equipment and new construction materials. Modern transfer and handling machinery have eliminated the reasons

SOUTHERN SCHOOL ON SOYA

Some 75 guests, interested in the use of soya flour in bakery products, gathered at the Biltmore Hotel in Atlanta, Ga., to hear representatives of the A. E. Staley Mfg. Co., who came from Decatur, Ill., to conduct a school and give practical demonstrations. The group is shown here as they gathered for a buffet supper in the hotel's ballroom.

for the gravity-flow layout. More attention probably will be paid to storage facilities to keep raw materials free from excessive moisture, insects and vermin. Centrifuges may take the place of filters and fixed or movable sanitary piping that of rubber hose.

Much stress will be laid on conservation of water, steam, power and a more complete reclaiming of byproducts.

Postwar Equipment

Brewing equipment was discussed by Robert Schock, who foresees the substitution of stainless steel, nickel or stainless steel- and nickel-clad materials for copper, iron and steel in the brewhouse. Master brewers will prefer jacketed units to direct steam injection, especially in conjunction with pressure cookers. Electronic recording thermometers will automatically control and affect temperature changes. A number of American improved mash filters are now on order for postwar delivery; multiple-roller malt mills will supplement the installation of mash filters. Sterile air-conditioners in combination with Precipitron air cleaners will protect the beer where in contact with air.

At the third technical session, S. Laufer emphasized the fact that the composition of water changes during the year with the seasons and, therefore, necessitates adjustments in the water treatment.

Wartime conditions have increased the use of malt adjuncts from 27.9 in 1937 to 41.3 in 1944, according to K. Becker. It is expected that some, if not many, of the newer adjuncts will be retained after the war. Corn and sorghum adjuncts have shown the greatest increase, while only slightly more rice has been used. Sugars and sirups account for about 15 percent of all adjuncts. Raw barley and wheat products have presented the greatest problems in processing. Changes in brewing water have been helpful in compensating for certain constituents or behavior of new adjuncts.

Some experiments have been conducted on the maltability of the sorghum grains. In the laboratory sorghum is readily malted; however, if used as an adjunct, not much is gained by malting kaffir or milo, as long as it is used with sufficient amounts of malt to convert the starch.

Meat Dehydration

THE dehydrating of meat, in experiments conducted by the U. S. Department of Agriculture, reduced the weight 60 to 70 percent. Subsequent compression of the product for packaging reduced the volume 65 to 73 percent.

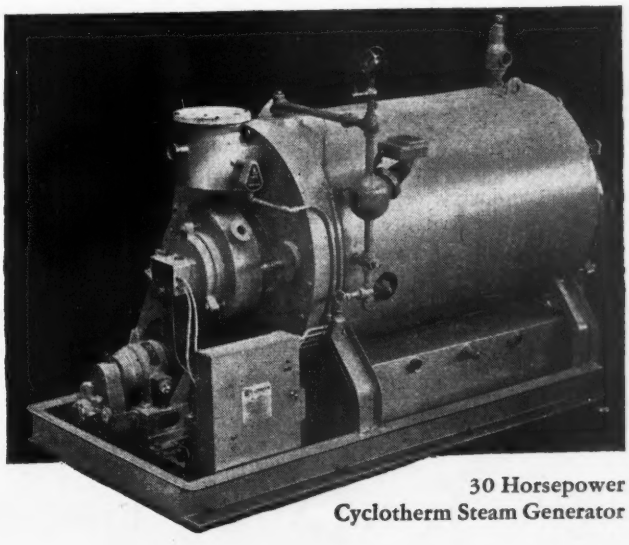
DOLLAR EFFICIENCY—work done per dollar spent—measures the value of steam generation

If you are planning immediate boiler installation or replacement, the efficiency and economy of a Cyclotherm Steam Generator will interest you. While the range of available units obviously cannot be on a peace time basis, Cyclotherm engineers will gladly cooperate in meeting your needs in power, processing or heating with available units.

Cyclotherm meets the dollar efficiency test through a wide power range (10 to 300 horsepower) with both oil and gas fired units. Its exclusive principles of combustion and design have proved Cyclotherm's dollar saving and dollar making capacity under most rigorous operating conditions.

Cyclotherms are fully automatic, sturdily built and completely self contained. They give years of trouble free service with a minimum of attention.

Detailed additional information will be supplied promptly upon request. Our engineers are available for consultation.



30 Horsepower
Cyclotherm Steam Generator

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STEAM GENERATOR

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OSWEGO . . NEW YORK . . BOX 701

Fruit Growers Exchange Buys Big Timber Tract

A $10,300,000 transaction whereby California Fruit Growers Exchange, through its subsidiary. The Fruit Growers Supply Co., expects to acquire extensive properties, including 83,000 acres of timber land, from Red River Lumber Co., was disclosed recently in San Francisco.

Red River properties, it was pointed out in the application, are needed to support the Supply Co.'s Box Shook operations carried on for Fruit Growers Exchange members. Current needs of the Supply Co. approach 170,000,000 bd. ft. of lumber annually.

Peak in Cold Storage Was Passed in October

THE PEAK in cold storage occupancy was reached during the month of October, according to estimates of War Food Administration officials. Of the seven principal commodities using freezer space, butter, cream and eggs are declining. Frozen fruits and vegetables have probably reached their peak and should ease.

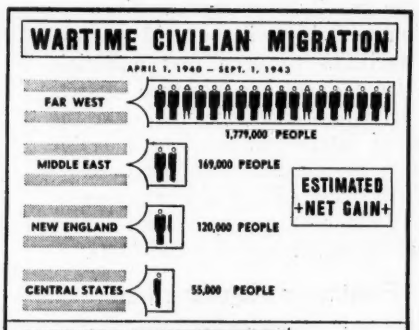
The restriction WFA placed on the quantity of fruits and vegetables that may be placed in freezer storage to the same quantity held there on October 1, 1943, was expected to provide storage space for 4 of every 5 lb. produced. The task group of the frozen fruits and vegetables industry verified this estimate with a report that inventory stocks of frozen fruits and vegetables on October 1, were probably about 85,000,000 lb. more than on the same date a year ago. "The 1944 increase in inventory stocks of both fruits and vegetables over last year amounts to about 22 percent," the report said.

Space for Meat

The three other major commodities using freezer space—pork, lamb and beef—are expected together to average approximately the same occupancy in the coming months as at the present time. In this way the armed services are feeding fresh meat in preference to canned meat. Now that such a big portion of fresh meat is being shipped abroad in the frozen state, there is not a sufficient amount of freezing capacity available, which has developed an additional demand for freezer space to be used for freezing meat.

This is the reason behind the arrangements that were made for the allocation of freezer space for the use of the armed services in 20 of the leading meat packing centers. WFA issued an order that provides for the allocation of freezer space for periods of not more than seven days. This applies to the freezer space only and space that is unoccupied. Cooler space is not affected by the orders and allocations cannot be used at warehouses in which government-owned commodities occupy more than 50 percent of the freezer space.

It is expected by government officials that the use of freezer space to freeze meat for the armed services will continue until about the first of next March. Butter, eggs and cream, early strawberries and some early asparagus are expected to be moving into freezer space by that time.



POPULATION SHIFTS

The already complicated problems of wartime distribution are further confused by population shifts. The above chart indicates the extent of these shifts in recent years, which so seriously affect food disposal.

Egg Space Needed

Eggs will again be a storage problem next year. One of the difficulties will be in the supply of usable egg cases, without which the warehouses will not accept the eggs.

Nothing is now going into cooler space except apples. WFA kept its promise to get out of the apple houses in time to take care of the storage of this season's crop. The mid-September order which prohibited storage of dried and evaporated fruit in refrigerated warehouses during the last quarter of the year forced enough dried fruits out of the apple houses to provide for 1,800,000 bu.

BEEF FOR THE TROOPS

These Yanks from the quartermaster corps are loading trucks with fresh beef at Batilly, France, from where it will be taken to troop kitchens in the front line of fighting.

Court Opinion Withdrawn In Vitamin Patents Case

THE status of three lucrative Steenbock vitamin patents held by the Wisconsin Alumni Research Foundation still was indeterminate in mid-October when the Ninth U. S. Circuit Court of Appeals in San Francisco concentrated on writing a new opinion in the patent rights case.

Over a year after it had held that producing vitamin D by ultraviolet radiation is a "process of nature," thereby voiding the patents, the Circuit Court suddenly withdrew the opinion, leaving the case wide open. The foundation has received over $7,500,000 in royalties and user fees.

RAW MATERIALS

Record Food Output Seen As Corn Crop Improves

FOOD PRODUCTION on farms this year may rank with that of 1942 as the greatest in history, an early October report by the U. S. Department of Agriculture indicated. Corn prospects jumped 96,000,000 bu. over the outlook a month earlier to indicate an all-time record of 3,196,977,000 bu. This is in addition to bumper crops of wheat, grain sorghums and perhaps rice, as well as record production of fruits, commercial vegetables, peanuts and tree nuts. Also above levels reached in most prewar years are the estimated total yields of beans, peas, soybeans, potatoes, and sweet potatoes.

More Fluorine Allowed In Apples and Pears

SLIGHTLY more fluorine is permissible in apples and pears and their products than was previously allowed by the Food and Drug Administration. The new tolerance authorized is 7 milligrams of fluorine per kilogram, or 0.05 grain of fluorine per pound of apples or pears. This tolerance applies, of course, only to the residues unavoidably present from insecticide sprays used on fruit.

Citrus Producers Plan Joint Problems Board

INITIAL STEPS in the formation of a Joint Problems Board on Citrus Research were taken recently, in Los Angeles, when 22 representatives of the technological divisions of the citrus industries in California, Florida and Arizona met informally to discuss problems that are common to those three states and Texas, as the major citrus producing areas.

GENERAL

Association Hears WFA Egg Products Program

RELEASE of the War Food Administration's 1945 Lend-Lease program for the drying of eggs is promised by January 1 at the latest, and by December 1 if possible, according to announcement made to members attending the fall meeting of the National Egg Products Association in Chicago on September 11.

Announcement was made also that no effort is being made to build up additional stocks on hand, that present buying is on the basis of actual current need, and that shipments for 1945

Food Plants Across the Nation Use

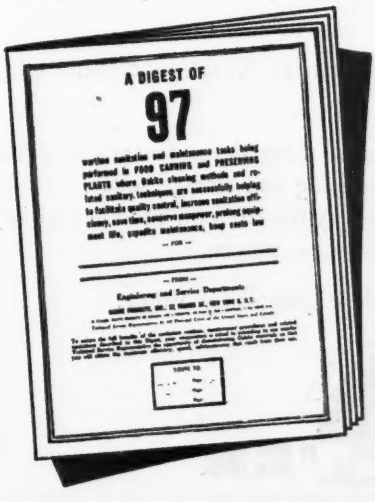
OAKITE CLEANING

Materials ★ Methods ★ Technical Service

to help safeguard product quality, to conserve equipment . . . time . . . effort, to handle daily clean-up work easier and to help keep sanitation costs low!

INCORRECT methods of cleaning and use of wrong detergents on processing and handling equipment prevent to a considerable degree, the attainment of essential high standards of sanitation that modern food production requires.

Quality control of products demands constant checking of sanitation procedures to see that they are performed thoroughly and correctly. And using the right cleaning material enables you to handle your daily clean-up work easier, faster and at less cost. That is why you will want a copy of this specially prepared, 24-page comprehensive Oakite Digest. It describes tested materials and techniques for facilitating the handling of 97 different cleaning, de-scaling and related jobs, including germicidal treatment of equipment. All are based on successful, current-day experience in vegetable and fruit, meat, fish and other food packing plants the country over.



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Only when you read this informative Digest will you realize the many ways it outlines for stepping up sanitation efficiency. Your copy is FREE for the asking. Write for it TODAY!

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OAKITE — MATERIALS . . METHODS . . SERVICE — Buy Bonds for Victory — CLEANING — FOR EVERY CLEANING REQUIREMENT

EGGS
Frozen Faster with
VILTER FRIGID BLAST

At Central Warehouse, St. Paul, Minnesota, the Vilter Frigid-Blast Freezing system shown above freezes fresh eggs in 30 lb. containers on an "Around-the-Clock" schedule. Whole, fresh eggs are broken, tested for quality, poured into 30 lb. containers, loaded onto platform skids and wheeled into the freezing cells. Here a blast of sub-zero air is forced over, around and through each skidload.

RESULT: Quality, frozen eggs in *shorter freezing* time. And the original equipment investment and operating cost is surprisingly low.

The Vilter Frigid-Blast Freezer at Central Warehouse also freezes meats and poultry.

Frigid-Blast Freezing is only one of many developments at Vilter contributing to improved food processing and storage today. Frigid Blast Systems are used to freeze all types of food products in any quantity, either in batches or by continuous process.

For faster freezing specify complete systems by Vilter.

Superior Since 1867
VILTER
Air Conditioning Refrigeration . . .

ARMY E NAVY

The VILTER MFG. COMPANY
2115 South First Street • Milwaukee 7, Wisconsin
Offices in Principal Cities

will be authorized only on the basis of the 1945 production program.

This declaration of policy is based on the existing contracts which provide for the purchase of 50 percent of production of contracting companies during the months of September through December of this year with the provision that the remaining 50 percent of current production will be taken if needed. The full 100 percent of production was taken for the month of September.

In their efforts to protect contracting processors against inventory loss on eggs purchased or held in storage for drying, WFA gives no protection to speculation buyers or holders of eggs. Only those who have bought or stored eggs prior to September 1, against requirements to fill actual contracts with government agencies, will receive the protective recognition.

A report on the container outlook for 1945 indicates allocations essentially the same as for 1944 with respect to fiber cases for shell eggs, fiber containers for frozen eggs and fiber drums for dried eggs serving as complementary or alternate containers. To that end, dried egg purchase contracts are being amended to permit shipment of powdered eggs in fiber drums which have been approved by WFA as a substitute for wooden barrels.

New IFT Group

INSTITUTE of Food Technologists members in the area bounded by Syracuse on the East, by lakes Ontario and Erie on the North and West and by Pennsylvania on the South have organized a regional group known as the Western New York Group and having the following officers:

Chairman—Walter D. Pheteplace, Jr., Pfaudler Co., Rochester, N. Y.

Vice-chairman—K. G. Dykstra, Snider Packing Co., Albion, N. Y.

Secretary-treasurer—F. A. Lee, New York State Agricultural Experiment Station, Geneva, N. Y.

United Fruit Opens Pan American School

ESCUELA Agricola Panamericana (School of Pan American Agriculture), founded and maintained by United Fruit Co., was inaugurated on Columbus Day with simultaneous ceremonies in New York and Honduras, where the school is situated, some 30 miles below Tegucigalpa. When completed, the school plant will have cost United Fruit more than $1,000,000. Students, drawn from all Central American countries, receive free a three-year course in tropical agricul-

USELESS SURPLUS PROPERTY

The problem of disposal of surplus government property after the war is shown by these four gadgets. None of them has any known postwar use. The forming end mill cutter (top center) cost $8.00 and has a scrap recovery value of only 5 cents. At the left center is a fuse gage costing $189 and is worth less than a dime today. The big circular form cutter at the right, costing $80, might bring 25 cents for scrap. The fuse gage, at the bottom, cost $283 and is now hardly worth 30 cents. The public must be made to understand these necessary losses. They are the price of victory.

ture, with a fourth year for those who show special promise.

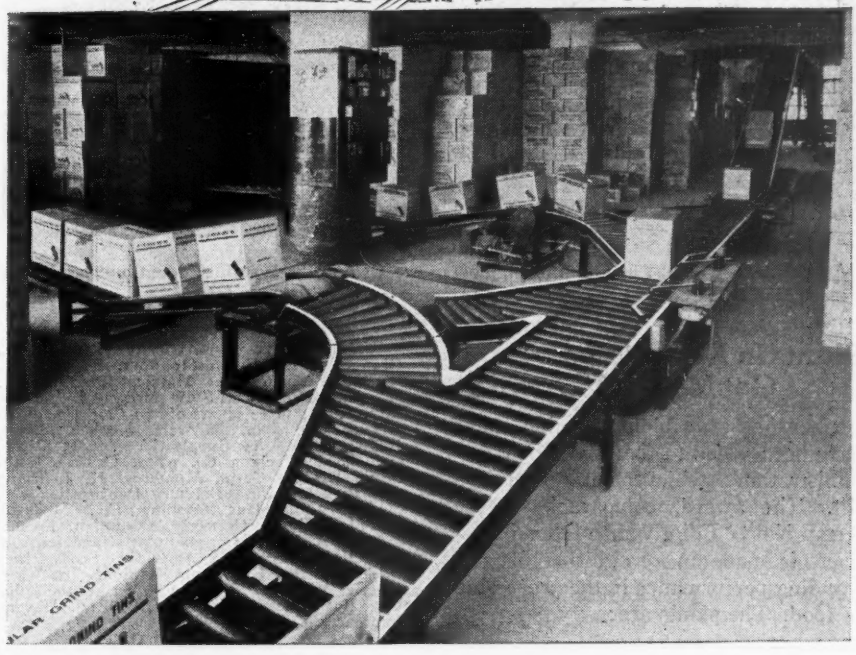
Dr. Wilson Popenoe, former specialist in tropical agriculture of the U. S. Department of Agriculture, is the director and is aided by a cosmopolitan faculty from the several Central American republics.

Changing Conditions Shown in WFA Sales

THE changing food picture is reflected by increasing WFA announcements of sales of various commodities bought by the government for war purposes, but now being released back into civilian channels because they are no longer needed. A year ago these sales were few and far between, but with more favorable war developments abroad and indications that stockpiling of huge amounts of food is no longer desirable, WFA is releasing accumulated food stocks at more frequent intervals. Since May 1 the agency has sold over $22,000,000 worth of stoodstuffs.

Lovegren Resigns

CARL N. LOVEGREN of Piedmont, Cal., has resigned his position as head of the OPA Processed Fruit and Vegetable Section, Food Price Division, to reenter the canning business in California.



STANDARD CONVEYOR COMPANY is able, through long experience, to specify and build for a diversity of handling needs . . .

A procession of products, of the widest imaginable variety, is pouring off assembly lines today—on time, or ahead of schedule — because Standard Conveyors are helping to channel the flow of production. Whether the rate of manufacture is several hundreds a minute or one an hour, Standard builds the right type of conveying equipment to meet the situation.

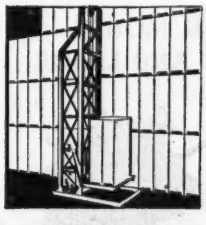
The range and versatility of Standard Conveyor equipment is the result of nearly 40 years of close contact with inside-the-plant transportation — in plants large and small, making products as widely diverse as steel or cosmetics. Check with Standard Conveyor for the right kind of conveying equipment to "deliver the goods" faster — at lower cost — now or for postwar production.

Write for comprehensive reference book — "Conveyors by Standard" — Catalog No. FI-114.

STANDARD CONVEYOR CO.

General Offices: North St. Paul, Minn.

Sales and Service in Principal Cities



TIERING AND LIFTING MACHINES

PORTABLE PILERS

SPIRAL CHUTES

PNEUMATIC TUBE SYSTEMS

Press Association Photo

HURRICANE FRUIT

Approximately 75,000 tons of apples, most of them windfalls from the recent hurricane that lashed the East Coast, are here piled up to be made into cider and vinegar.

Plants in Nine States Get Merit "A" Awards

FOOD PROCESSING plants in nine states have been added to the War Food Administration's achievement "A" award list. The award, comparable to the Army-Navy "E," given to other industries, is made in recognition of outstanding performance in the processing of food. The plants are:

General Foods Corp., Minute Tapioca Co., Orange, Mass.; Green Mountain Packing Co., Inc., St. Albans, Vt.; Marshall Produce Co., Marshall, Minn.; Tri-State Milling Co., Rapid City, S. D.; three plants of the California Conserving Co., Inc., Hayward Kitchens Plant, Hayward, Mt. View Supply Co. plant, Mt. View, and Pacific Packing Co. plant, Oakdale, California Packing Corp., Monterey, H. J. Heinz Co., Berkeley, Pasa Del Oro Dehydrating Co., Modesto, Stanislaus Canning Co., Modesto, Sun-Maid Raisin Growers Association, Fresno, Cal.; S. A. Moffet Co. plants at Grandview and Mt. Vernon, Wash.; American Foods, Inc., Opelousas, B. F. Trappey's Sons, Inc., Lafayette, Warriner Starch Co., St. Francisville, La.; Boaz Creamery, Boaz, Ala.; and Havana Canning Co., Havana, Fla.

Brewers Consolidate

THE United States Brewers Association and the Brewing Industry Foundation have merged into one organization, as anticipated in the October issue of FOOD INDUSTRIES, page 102. The new organization is to be known as the United States Brewers Foundation and will be headed by Herbert J. Charles, Theo. Hamm Brewing Co., St. Paul, as chairman.

SCHEDULE OF EVENTS

NOVEMBER

1– 2—Packaging Institute, annual meeting, Hotel New Yorker, New York.

2– 4—International Association of Milk Sanitarians, annual meeting, La Salle Hotel, Chicago.

13–14—New England Bakers Association, fall conference, Hotel Statler, Boston.

15–19—American Chemical Society, third national chemical exposition, Coliseum, Chicago.

20–21—Grocery Manufacturers of America, Inc., annual meeting, Waldorf-Astoria Hotel, New York.

29–30—American Butter Institute, 36th annual meeting, La Salle Hotel, Chicago.

DECEMBER

10–13—American Society of Refrigerating Engineers, 40th annual meeting, Hotel Pennsylvania, New York.

SYNTRON

ELECTRIC VIBRATORS

MAKE STUBBORN, BULK MATERIALS FLOW FREELY THRU BINS, HOPPERS & CHUTES

3600 powerful "Electronic-Controlled" vibrations per minute, break down arching and plugging—without damage to prime equipment.

Eliminate pounding and sledging.

SAVE—
TIME, MONEY
AND LABOR

8 Models, each with rheostat control of power—from a little 4 lb. size up to big 500 lb. models, with capacities of from 1 cu. ft. hoppers up to big 100 ton bins. Operate from 110, 220, or 400 volt AC current.

SYNTRON COMPANY

460 LEXINGTON AVE. HOMER CITY, PA.

LEGAL NOTICE

STATEMENT OF OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933

Of Food Industries, published monthly at Chicago, Ill., for October 1, 1944.

State of New York } ss.
County of New York }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared J. A. Gerardi, who, having been duly sworn according to law, deposes and says that he is the Secretary of the McGraw-Hill Publishing Company, Inc., publishers of Food Industries, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers is: Publisher, McGraw-Hill Publishing Company, Inc.; Editor, Laurence V. Burton; Managing Editor, F. K. Lawler; all of 330 West 42nd St., N. Y. C. 18; Business Managers, none.

2. That the owner is: McGraw-Hill Publishing Company, Inc., 330 West 42nd St., N. Y. C. Stockholders holding 1% or more of stock: James H. McGraw; James H. McGraw, Jr.; James H. McGraw, Jr., Curtis W. McGraw and Edwin S. Wilsey, Trustees for: H. W. McGraw, J. H. McGraw, Jr., D. C. McGraw, C. W. McGraw; Curtis W. McGraw, Donald C. McGraw; all of 330 West 42nd St., N. Y. C.; Edwin S. Wilsey and Curtis W. McGraw, Trustees for J. H. McGraw, 3rd, Madison, New Jersey; Mildred W. McGraw, Madison, New Jersey; Wilson C. Laucks, Spruce and Canal Sts., Reading, Pa.; Grace W. Mehren, 73 No. Country Club Dr., Phoenix, Ariz.; Margaret Stump, 1418 Rose Virginia Rd., Wyomissing Park, Reading, Pa.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

J. A. GERARDI, Secretary.

McGRAW-HILL PUBLISHING COMPANY, INC.

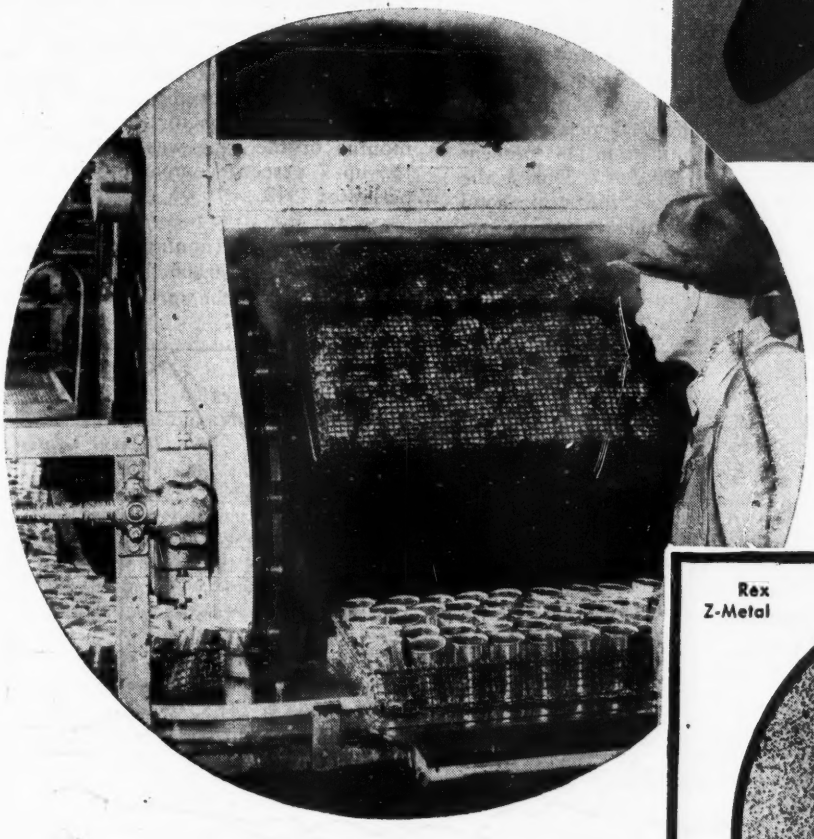
Sworn to and subscribed before me this 29th day of September, 1944.

[SEAL] ELVA G. MASLIN.

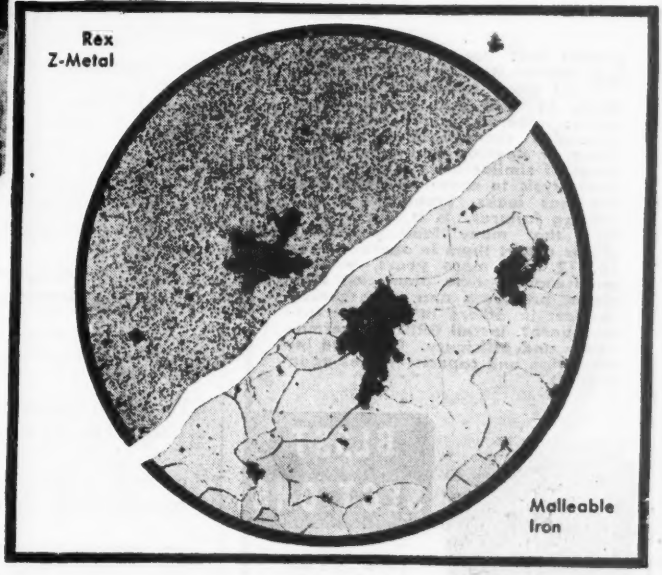
(My commission expires March 30, 1946.)

THAT CHAIN BELT CAN TAKE IT!

❶ WORKING IN A FISH CANNERY is no snap for a chain belt. Fish scales and slime, with their damaging corrosive action, can materially shorten the life of an ordinary chain. But not Rex Z-Metal. It's built to take it . . . to operate efficiently under dirty, moist or corrosive operating conditions.



❷ TAKE THIS COOKER for example. The chain belts driving the cooker and conveying the cans are made of Rex Z-Metal. For the live steam and corrosive conditions would rapidly corrode ordinary chain. For economical, trouble-free service in canneries, bottling, packing and food processing plants, Z-Metal can't be beaten.



❸ HERE'S WHY Z-METAL IS TOUGH. This photomicrograph (200 X magnification) clearly indicates the uniformity of Z-Metal's grain structure. The small spheroidal particles in the Z-Metal are iron carbide. They and their relation to each other impart the greater strength and hardness to Rex Z-Metal.

• • •

Rex Z-Metal chain belts are the answer to many drive or conveying problems involving heavy loads or corrosive conditions. The Rex Man can help you with your chain belt application problems. And for engineering data ask for the 768-page catalog No. 444. Chain Belt Company, 1616 West Bruce Street, Milwaukee 4, Wisconsin.

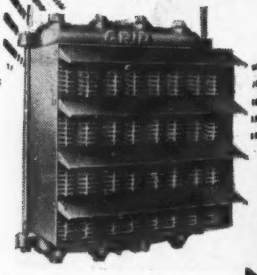
REX CHAIN BELTS

More than 2000 sizes and types for the positive transmission of power, timing of operations and conveying of materials

CHAIN BELT COMPANY OF MILWAUKEE

Rex Conveying and Engineering Products Division, Rex Chain Belt and Transmission Division, Milwaukee, Wis. - Baldwin-Duckworth Chain Belt Division, Springfield, Mass.; Worcester, Mass.

Withstands 250 LB. STEAM PRESSURE

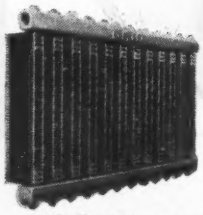


and here's why!

HIGH TEST CAST IRON HEATING SECTIONS

One piece construction heating section (patented) of high test cast iron.

GRID Unit Heaters are built to last—to stand wear as long as the pipes furnishing steam to them. In GRID Unit Heaters there are no soldered, brazed, welded, or expanded connections to become loose or develop leaks, and being made of similar metals there is no electrolysis to cause corrosion that produces leaks, breakdowns, and heating failures. Is it any wonder then that many food processing plants report them in operation for 10, 12, and more years, without maintenance—some plants on high steam pressures and very severe service; in others in corrosive atmosphere? Install GRID for permanency and efficiency. Complete information and capacity tables upon request.



BLAST SECTIONS

The same high efficiency and lasting qualities as GRID Unit Heaters . . . one piece construction "fin" sections of high test cast iron . . . no tortuous air passages . . . complete absence of ruptures, strains, and warping. Guaranteed for steam pressures up to 250 lbs. Complete information upon request.

D. J. MURRAY MANUFACTURING CO.
WAUSAU, WISCONSIN
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GRID

INDICATORS

Production

Flour production was up slightly in September, totaling 14,690,348 sacks, or 507,617 sacks higher than in the same month a year ago. This output, reported by *The Northwestern Miller*, represented 73 percent of total U.S. production.

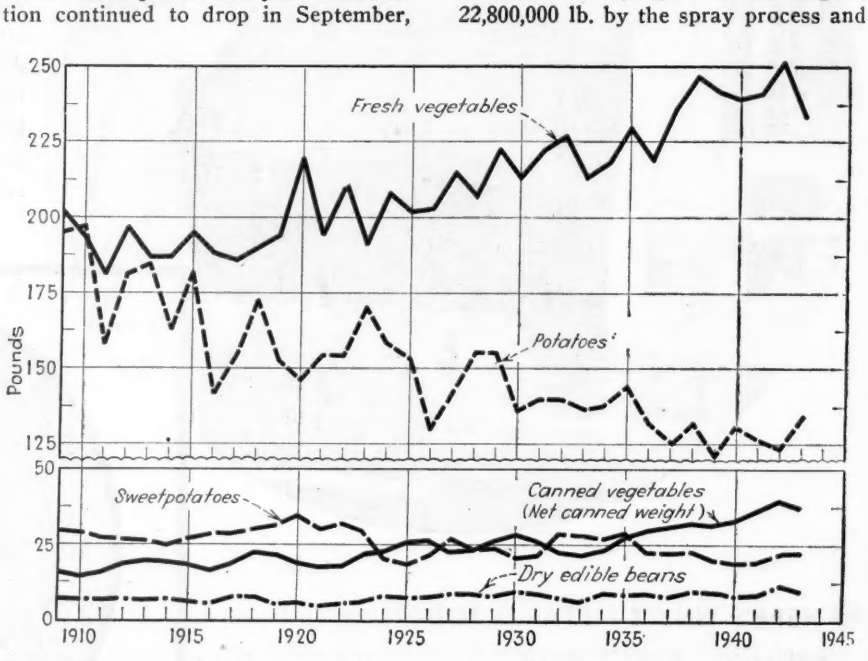
Red pitted cherry canners this year packed more than five times as many cans as in 1943—3,071,940 as against 561,778—National Canners Association reports.

Creamery butter production in August continued at the lowest level during 20 years for the second successive month. The output was estimated at 130,230,000 lb., down 15 percent from the previous month and 14 percent lower than in August, 1943. During the first eight months of the year, total production of creamery butter was 1,098,619,000 lb., 12 percent less than in the same period last year. Production continued to drop in September, with receipts at the four larger markets 17.6 percent lower than in August and only about half the 1938-42 September average.

American cheese production in August was 74,340,000 lb., down 2 percent from a year earlier, the BAE reports. This decline, however, follows four months of production in excess of last year's levels, and the present output is 31 percent higher than the 10-year August average.

Evaporated milk production in August was the highest ever recorded for the month, amounting to 312,000,000 lb., 13 percent above the figure for August, 1943, and 32 percent above the 1938-42 average. Production for the first eight months of the year was 2,476,016,000 lb., up 7 percent compared with that period of 1943.

Dry milk solids (nonfat) output was estimated at 51,300,000 lb. for August, 22,800,000 lb. by the spray process and



Per capita consumption of commercially canned vegetables has more than doubled since 1909, while the demand for fresh vegetables including melons, has gone up about one-sixth, as shown by this chart prepared by the Bureau of Agricultural Economics. But the quantity of potatoes eaten per person has decreased about one-third, and sweet potato consumption declined about one-fourth.

CHANGE OF ADDRESS

McGRAW-HILL PUBLISHING COMPANY
330 West 42nd Street, New York 18, N. Y.
Director of Circulation:

Please change my address on "Food Industries"

From .....

.....

To .....

.....

Signed .....

CONSTRUCTION NEWS

	Pending (thousands)	Awarded October (thousands)	Total Awarded 1944 (thousands)
Bakery	$ 320	$ 94	$ 354
Beverages	450	....	120
Canning and Preserving	40	45	405
Cold Storage	163	231	1,768
Confectionery	....	....	50
Grain Mill Products	125	295	1,715
Ice Manufactured	85	....	40
Meats and Meat Products	440	80	905
Milk Products	120	180	2,191
Miscellaneous	650	261	2,135
	$2,393	$1,186	$9,683

28,500,000 lb. by the roller method. Compared with a year ago, the spray product was up 6 percent, the roller product, 35 percent.

In Storage

Creamery butter in cold storage on September 1 was considerably below the 1939-43 average of 178,212,000 lb., amounting to only 138,378,000 lb., of which 75,813,000 lb. represented government holdings.

American cheese held in cold storage totaled 186,392,000 lb. on September 1, appreciably above the 1939-43 average of 159,856,000 lb. Government holdings were 84,461,000 lb.

Eggs, shell and frozen, were in cold storage on September 1 to the extent of 17,586,000 cases, less than the highest August 1 figure of 19,712,000 cases but far above the 1939-43 average of 12,670,000 cases. More than half the eggs in storage were frozen.

Frozen poultry was held in cold storage warehouses on September 1 to the extent of 160,002,000 lb., far above the 141,654,000 lb. figure for August 1.

Meats and lard showed a record net out-of-storage movement of 166,900,000 lb. and 99,000,000 lb., respectively, during August. But in spite of this change, meat stocks were 15,500,000 lb. greater on September 1 than a year earlier and 168,400,000 lb. above the 5-year average. Lard holdings were 40,835,000 lb. higher than the 5-year average, but were 16,000,000 lb. below a year ago.

Frozen fish and shellfish in storage on September 1 amounted to 123,698,620 lb., compared with a 5-year average of 94,089,000 lb.

Indexes

Cost of living index of National Industrial Conference Board was 105.0 in September as compared with 105.1 in August and 103.1 a year ago.

Business activity index of *Business Week* stood at 230.8 for the week ending October 14, compared with 230.8 a month earlier and 240.7 a year ago.

D-LUXE

LEAVES NO "freckles"

ON FOOD-PROCESSING EQUIPMENT

Freckles may be an asset to a smiling youngster, but on food-processing equipment they can be a decided handicap. We mean those white deposits and water spots that so often show up on sanitary piping and other bright surfaces after cleaning . . . especially with hard water.

That's one reason why more and more food-processing plants are turning to D-LUXE these days. D-LUXE provides a new and different type of water-softening action that assures trouble-free cleaning . . . a unique free-rinsing action that produces a spot-free, "like new" appearance to all surfaces.

Furthermore, D-LUXE goes after dirt on pasteurizing vats, sanitary pipe lines and fittings, tanks and other equipment with a powerful emulsifying action that literally shatters grease . . . breaks it up into tiny globules which float in the cleaning solution (makes an emulsion just like butterfat in milk!)

Efficiently cleaned with D-LUXE, food-processing equipment can be made to last longer . . . works better . . . can meet the urgent demands for greater output.

Just call a DIVERSEY D-MAN for help with your sanitation problems

THE DIVERSEY CORPORATION
53 West Jackson Blvd., Chicago 4, Ill.

YARWAY Spray Nozzles

INVOLUTE TYPE FOR CONE-SHAPED SPRAY

for WASHING • RINSING • COOLING • HUMIDIFYING

Get the most out of your Spraying Equipment without unnecessary power or liquid waste.

Use Yarway Nozzles. No internal vanes or other restrictions to clog or hinder flow. Two types—Yarway Involute type producing a fine cone-shaped spray with minimum energy loss, and Yarway Fan type producing a flat, fan-shaped spray with time-saving slicing action for cleaning.

Wide range of standard sizes and capacities. Cast or machined from solid bar stock.

Many thousands in use. Write for literature.

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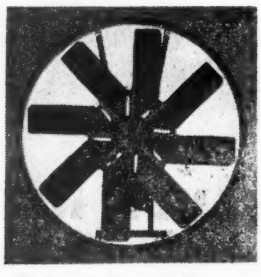
Philadelphia 18, Pa.

FAN TYPE FOR FLAT SLICING SPRAY

Increase . . .
EMPLOYEE EFFICIENCY
with Coolair TRADE MARK



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for SCIENTIFIC VENTILATION

Keeping workers comfortable is one of the most important factors in maintaining an efficient working organization. If the change of air is not sufficient for comfort, the amount of work an employee can perform in a given time is seriously affected.

So, act now! We are in the position to accept your order for COOLAIR Fans and will make shipment as early as possible on an "order first—shipment first" basis. It will pay you to anticipate your needs at once and place your order at the earliest possible moment.

CATALOG PAGES
Fan models, dimensions and performance data can be found
In SWEET'S ASHVE GUIDE and ELECTRICAL BUYER'S REFERENCE

All orders must bear a priority rating of AA-5 or better. If CMP Regulation 5 does not cover your requirements, file form WPB-541 (formerly PD-1A) with your nearest field office.

AMERICAN COOLAIR CORPORATION
"Pioneer Manufacturers of V-Belt Drive Exhaust Fans"
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OPA Orders

Pepper—Lampong black pepper is increased from 6½ to 10 cents a pound by Amendment 1 to Rev. Price Schedule 52 and Amendment 178 to the GMPR, both effective October 9. The amendment also fixes processor's ceiling price for sales of bulk ground pepper in bags f.o.b. New York at 12 cents a pound, an increase of approximately 2 cents. These increases are to be absorbed by the industrial users.

Grapes—Maximum prices for Concord grapes, sold for processing, are set at $85 per ton for Area 1 and $52 per ton for Area 2 (Washington, Oregon, Idaho, Montana and Wyoming). Apples sold for processing are removed from price control by the same action, which is contained in Amendment 10 to MPR 425, effective October 6.

Fruits and Vegetables—Processor's ceiling prices for the following fruit and vegetables, under the formula of permitted increases above the price during the first 60 days of the 1941 pack, are established by amendments to Food Regulation 1: Sweet corn, under Amendment 9 to Supp. 7; Bartlett pears produced in California and packed either diced or in peeled halves or quarters, under Amendment 10 to Supp. 7; fruit cocktail produced in California, under Amendment 12 to Supp. 7; packed tomatoes, asparagus and peas in three producing areas, under Amendment 13 to Supp. 7, and dried apricots, peaches, pears, prune, raisins and figs, under Supp. 9.

Amendment 12 to MPR 409 stipulates that processors who sell frozen or packed fruits and vegetables under "adjustable pricing" are required to adjust their prices downward if their 1944 ceilings are lower than 1943 maximums for the product.

Salmon—The price of select-mild-cured salmon, used as a raw product for smoked mild-cured salmon, has been increased 3 cents, to 34½ cents a pound f.o.b. Seattle, by Amendment 1 to MPR 550, effective September 19. The price of other size slabs of Chinook or Silver salmon is increased from 26½ cents per pound to 28 cents.

Peanut Oil—The same dollar-and-cents prices that have already been announced for domestic peanut oil will be applied to the imported variety, both crude and refined, according to Amendment 35 to MPR 53, effective September 30.

Sugar—Industrial users of sugar who pack, cure or process meats, fish or poultry may average out the use of sugar for each class of products at the maximum rate permitted for that class. The action, embodied in Amendment 45 to RRC 3, effective October 4, permits greater flexibility in the use of sugar. The user may use sugar for, and include

in the average, only those products in which he used sugar in either 1941, 1942 or 1943.

Rice—Higher ceiling prices for unpolished rice are permitted by Amendment 1 to Second RMPR 150, effective October 7. This brings the prices for unpolished rice up to those permitted for highly polished rice, which range from $6.20 to $8.25 per 100 lb., depending on the variety, and encourages the production of unpolished rice needed by the Quartermaster Corps.

WFA Orders

Citrus Juices—WFO 22.7, effective October 9, stipulates that quantities of single strength citrus juices equivalent to the following percentages of the 1943-44 pack must be set aside: Grapefruit juice, 39 percent; orange juice, 30 percent; blended grapefruit and orange juice, 32 percent.

Oilseed and Soybeans—WFO 26, which restricted the sale of oilseed meal and WFO 27, effecting the purchase and use of soybeans are terminated as of October 11.

Dried Fruits—Packers of dried fruits, principally raisins and prunes, have been authorized to release substantial quantities of the 1944 pack into civilian channels. These entire packs had to be set aside under WFO 16.

Concord Grapes—Limitation on the use of Concord grapes for wine is removed by WFO 69.2, effective September 20. Previously their use had been restricted in the production of products containing 7 percent, or more, of alcohol, by volume.

Peppermint—Confectionery and Chewing gum manufacturers' quotas for oil of peppermint were raised from 70 to 80 per cent by an amendment to WFO 81, effective October 1.

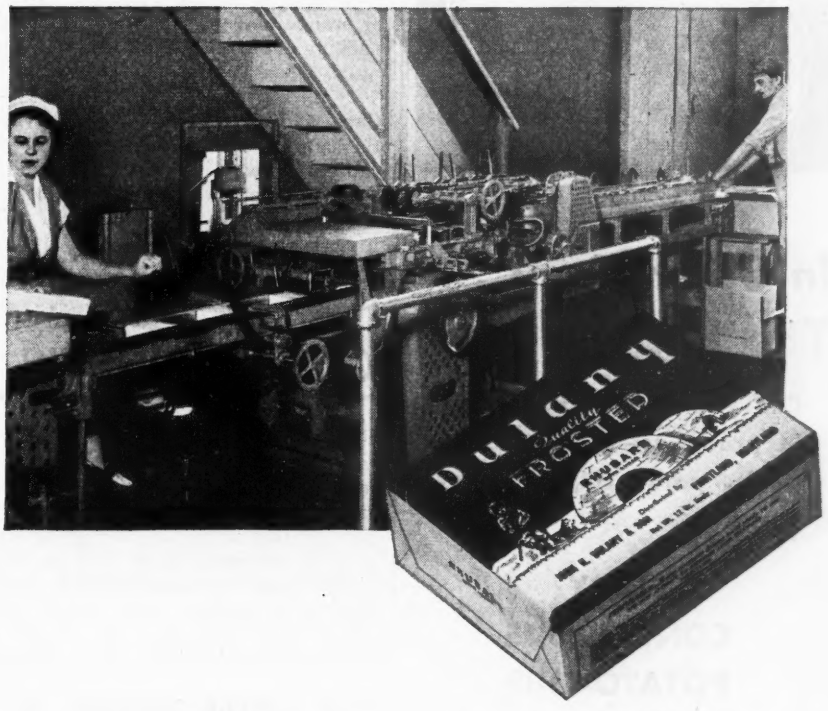
Hops—An amendment to WFO 66 entitles each brewer to purchase a quantity of hops equal to 150 percent of the quantity used by him in 1943, less the quantity on hand September 1. This is to insure equitable distribution of the available hop supply to members of the brewing industry.

Hogs—A support price of $12.50 per hundredweight, Chicago basis, for Good and Choice butcher hogs weighing 200 to 240 lb., is established by Amendment 17 to WFO 75, beginning October 1.

Cheese—In an effort to move the large supplies of roller-process nonfat dry milk solids, quotas limiting the sale of cottage, pot and baker's cheese, are removed by Amendment 5 to WFO 79, effective October 1.

The Cheddar cheese set-aside for October was reduced from 40 to 25 percent by WFO 15.11, issued October 16.

Dulany Speeds Up FROZEN FOOD WRAPPING with our FA model



John H. Dulany & Son recently replaced two slow-speed wrapping machines with our Model FA machine. So well pleased were they with its performance and the improved appearance of their packages, that they lost no time in ordering another FA to take care of their increasing production.

The FA is ideally suited to the particular requirements of frozen food packaging. It produces a tightly sealed and perfectly formed package, whether the foods are wrapped *before* or *after freezing*. Bulging cartons are pressed back into shape in the wrapping process, and they hold their shape because of the firm, tight wrap produced.

The FA will enclose the package in printed or unprinted waxed paper, cellophane or other suitable material. When printed material is used, the machine locates the printing accurately on the carton by electric eye. This mechanism remains accurate no matter how long the run.

The machine is *quickly adjustable* for a wide range of sizes. A new roll of wrapping material can be inserted in less than five minutes. These are important advantages when different products requiring different wrappers are being put through, or when private brands are being wrapped.

Wraps 60 packages per minute and permits automatic conveyor feed or hand feed with the minimum of labor.

Write today for our new leaflet on FROZEN FOOD wrapping

PACKAGE MACHINERY COMPANY
Springfield 7, Massachusetts
30 Church St., New York 7 • 111 W. Washington St., Chicago 2
101 W. Prospect Ave., Cleveland 15 • 443 S. San Pedro St., Los Angeles 13
32 Front St., W., Toronto 1

ARMY E NAVY

PACKAGE MACHINERY COMPANY
Over a Quarter Billion Packages per day are wrapped on our Machines

In Other Words . . .

The Perfect Chip!

Can you realize the profit in producing—continuously—perfect potato chips?

WITH

FERRY CONTINUOUS POTATO-CHIP MACHINES

you are assured of a perfect product. Machine is adjustable, and quickly changed, for turning out light, dark or medium chips—all crisp, clean and salted to a delicious flavor.

Every step in the process is automatic, and there is push-button control of cleaning, peeling, slicing, frying, drying, cooling and salting.

Read how these FERRY machines will make money for you, as well as help solve the man-power shortage. Available in 5 sizes, from 50-lbs. to 350-lbs. capacity per hour.

Write today for the full facts. Ask for Bulletin "F.J."

Also makers of

SLICERS AND AUTOMATIC SLICERS, FEEDERS AND CAN WASHING MACHINERY

J. D. FERRY CO.
129 SO. CAMERON ST.
HARRISBURG, PA.

WPB ORDERS

Tin Cans — Various food items may be packed in cans manufactured from secondary metal, by the inclusion of Schedule IV in M-81. The food items are baking powder, bouillon cubes, cereals, flour, cookies, biscuits and crackers for export only, dehydrated vegetables excluding soups, spices, salt seasoning and dry mustard, and tea.

A ceiling of 100 percent of last year's pack also is imposed on the canning of orange and grapefruit juice, but the packing quota on 14½ oz. cans of evaporated milk is increased by 5 percent.

Caps and Crowns — Use of salvaged tin cans for the manufacture of bottle caps or crowns is no longer permitted according to Direction 1 to M-325, issued October 7. This does not affect material now in possession of the user or manufacturer of such caps or crowns until Jan. 1, 1945.

Glass — The few foods previously limited in glass container use now appear in the unlimited column as a result of an amendment to L-103-b.

Fibre Containers — Shippers of fresh tomatoes are given unlimited quotas of fibre shipping containers in an amendment to L-317. The fresh fruits and vegetables for which these containers may now be used are apples, grapes, limes, mushrooms, pears, rhubarb and tomatoes. The amendment also subjects "W" boxes to the same use restrictions as are now applied to "V" boxes.

Paper Sacks — Shredded cocoanut, dessert preparations and pectin may be packaged in paper shipping sacks in minimum quantities of 25 lb., according to an amendment to L-279, Appendix A, issued September 21.

CAPITAL VIEWS

FALL HOUSECLEANING — Washington gossip indicates that housekeeping of food plants is now more important than ever. Food and Drug Administration inspectors are going to be a bit more fussy from now on, especially when German collapse makes food plant workers more readily available. Let's hope that the plants' fall housecleaning has been extra well done.

TOO LITTLE BUTTER — For at least a year to come there will be more trouble with butter scarcity than almost any other foodstuff that is important both in the home and food factory. No matter where they start discussing food economics, with respect to corn, feed, cattle, beef or a dozen other subjects, the government experts end up with their major worry — the butter scarcity. As they plan food formulas, food technologists can well cut back butter requirements as much as possible without serious sacrifice of food quality.

LET'S INTERNATIONALIZE!—International controls on food are definitely contemplated. It is evident that the new "Food and Agriculture Organization" is to be given large planning authority if present Washington planners have their way. Washington wonders how much of a commitment in the internationalizing of all food movement may have been made already. Certainly, one recent address by Paul H. Appleby indicates important commitments intended to keep this government in full control of this part of the food business.

LABOR CONTROLS — Food plant executives can expect that labor will be taken through USES operations for the "must" war plants, no matter whom it hits. Local managements competing with such war factories in their neighborhood are compelled now more than ever to educate the local USES offices, or the food factories may actually be shut down for want of workers.

Barnett's

CAROTENE

Vitamin A Potency 600 Million Units Per Pound

A NATURAL FOOD COLORING

WRITE FOR INFORMATION

BARNETT LABORATORIES — LONG BEACH 5, CALIF.

PLENTY OF METAL—There will be plenty of all metals needed for new food machinery building as soon as we get the cut-back on V-E Day. Those who have not got their new equipment orders on the books of some machinery company may be sorry. Sooner or later there will be long waiting lists for this equipment as the postwar modernization programs get well under way.

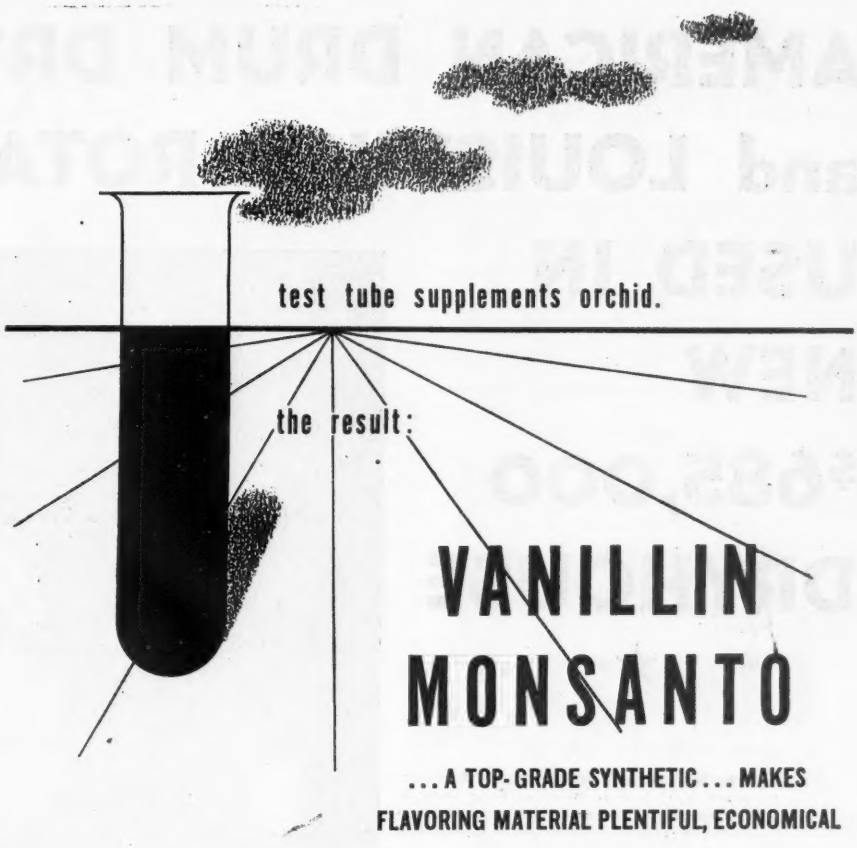
SCARCE COFFEE—Latin American business men apparently dislike OPA ceilings as much as some American firms one might name. They tried to hold up coffee shipments, until the American people were finally told that coffee rationing might again be necessary. Then some agency, apparently the Brazilian government, stepped in to promise an abundant supply to prevent that restriction. This was a necessary action from their point of view lest they again convert a lot of U. S. coffee drinkers to some other beverage. The coffee growers can ill afford that consequence of change in beverage habits.

POSTWAR PRICING—OPA is making a very subtle approach to the realities of life. It even admits now that something will have to be done about prices in the postwar period when scarcities no longer govern food markets. So what, Mr. Bowles?

SOYA DISAPPOINTMENT—Ardent government advocates of soybean products confess great disappointment. They have not found the expected, or hoped for, purchase of soya meal and soya flour either for home use or for industrial food manufacture. This lack of acceptance partially, but not wholly, accounts for present trends in the soybean business where embarrassing surpluses are looming just ahead.

A "POUND" REDEFINED—Among other things defined by OPA has been the minimum number of pieces of certain hard candies which had to be included in a pound. Late in September, it was decided that the required number of candy pieces of these types might be reduced from 110 to 70 without changing the price ceilings. This again is a recognition that it costs more to make more pieces even though the total weight is the same. Candy makers are pleased; but they still should not assume that this represents complete education of the economists at OPA regarding the technology of candy making. No indeed! They still can be taught a lot; or can they?

GOOBER BOOSTING—Peanut producers and processors must boost their sales, as acreage this year is three times as great as in 1939. The industry is planning to spend $900,000 during the next three years on a research and publicity program. The hope is that they can develop new civilian uses.



...A TOP-GRADE SYNTHETIC...MAKES FLAVORING MATERIAL PLENTIFUL, ECONOMICAL

The seed pods of tropical orchids were, from 1510 to 1876, the only source of vanilla, highly prized for its delicate aroma and flavor. Then it was discovered that vanillin, principal constituent of vanilla, could be manufactured from oil of cloves.

By 1929, as a result of Monsanto research, the test tube had supplemented both orchids and cloves, making vanillin plentiful and economical.

Vanillin Monsanto is produced under exacting methods. Each lot is checked by careful laboratory control. Raw materials used in making the flavor base also are produced by Monsanto under similar precise methods and controls. That is why Vanillin Monsanto always has true aroma and uniform flavoring strength.

We regret that we cannot promise prompt delivery of large quantities of Vanillin Monsanto. However, we shall be pleased to send you complete details and samples for your experimentation. Inquire of: MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri. District Offices: New York, Chicago, Boston, Detroit, Charlotte, Birmingham, Los Angeles, San Francisco, Montreal, Toronto.

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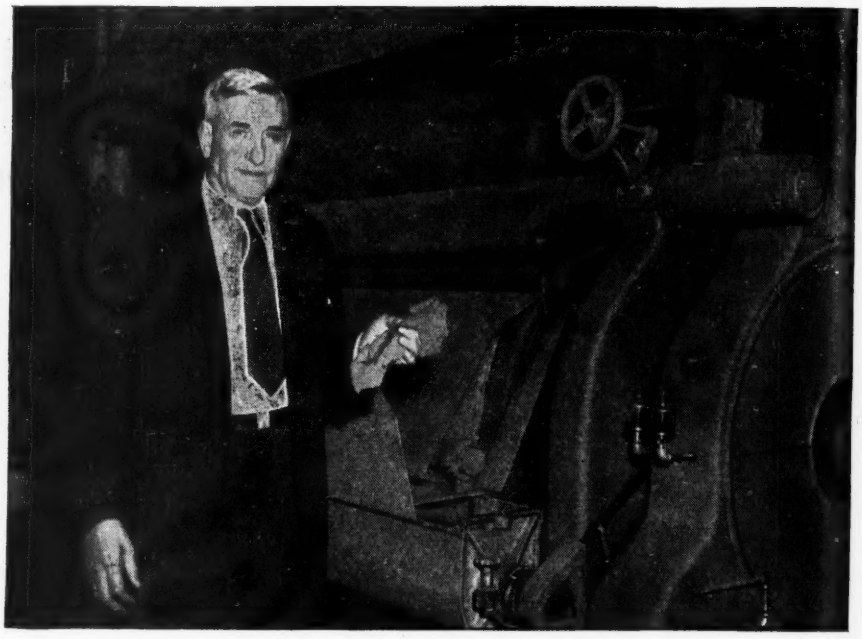
SERVING INDUSTRY...WHICH SERVES MANKIND

MONSANTO FLAVORING MATERIALS—
Coumarin Monsanto,
Ethavan (Ethyl Vanillin),
Methyl Salicylate Monsanto,
Vanillin Monsanto.

AMERICAN DRUM DRYERS and LOUISVILLE ROTARY DRYERS USED IN NEW $685,000 DRYHOUSE

★



Hon. Simeon S. Willis, Governor of Kentucky, poses in front of an American Drum Dryer at the opening of the new $685,000 dryhouse of the George T. Stagg Plant, Frankfort, Ky.

When the George T. Stagg plant of Schenley Distilleries, Inc., decided to install completely modern and up-to-date equipment for processing their distillery slop, they naturally turned to American for their Drum Dryers, and to Louisville for their rotary Steam Tube Dryers.

American Drum Dryers and Louisville Rotary Dryers are known throughout industry for their ability to do better, more uniform drying, at lower steam, power, labor and maintenance costs. They make an ideal combination for the recovery of solids from many types of wet wastes. Being designed, built and sold by *one* fully qualified organization, they offer you economies and advantages which we believe are not available elsewhere in America. We would be happy to send you full technical and general information. Write today.

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General American Process Equipment is a consolidation of four outstanding process equipment manufacturers, each a well-known specialist in its field, now welded together to serve you with one organization, one responsibility and one high standard of performance.

This Division is also closely associated with the Plate and Welding Division of General American Transportation Corp., at Sharon, Pa.

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FRACTIONATING COLUMNS, PRESSURE VESSELS

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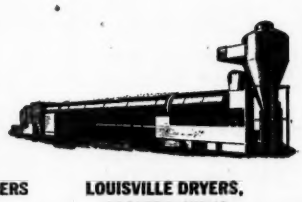
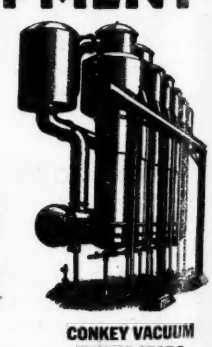
CONKEY VACUUM AND PRESSURE FILTERS

AMERICAN DRUM DRYERS AND FLAKERS



LOUISVILLE DRYERS, COOLERS, KILNS



CONKEY VACUUM EVAPORATORS

MEN • JOBS • COMPANIES

INDUSTRY

Blue Mountain Prune Growers Association, Milton and Freewater, Ore., have started construction of a $75,000 cold storage unit to be used for storage and freezing of fruits and vegetables.

The Borden Co. has taken over Tech Food Products Co., Pittsburgh. The new unit manufactures and distributes ice cream and ice cream novelties in and around Pittsburgh and Youngstown, Ohio. Other recent mergers announced include: The purchase by Hygrade Food Products Corp., New York, of the Baker Importing Co., Minneapolis; National Biscuit Co.'s purchase of the Clarence Martin Milling Co., Cheney, Wash., and the Indianapolis merger of Stokely Brothers & Co., Inc., and Crampton Canneries, Inc. Included among the assets of Crampton is a substantial interest in the W. R. Roach Co., also food processors. The merger was effective, Oct. 26, when the new company became Stokely-Van Camp, Inc.

California Prune and Apricot Growers Association has purchased a 28-acre $40,000 tract upon which they will build a large, modern fruit drying and packaging plant.

Chicken Products Co., Provo, Utah, is a new western poultry canner and quick freezer company headed by A. W. McCoy.

Enterprise Fish Packers, Monterey, Calif., is expected to start operations in their new $300,000 plant some time in November.

Hartmann Canning Co., Inc., Macedon, N. Y., has changed its name to Macedon Foods, Inc. The administrative and sales offices of the corporation have been moved to Williamson, N. Y.

New England Fish Co., Cordova, Alaska, was destroyed by fire September 8 with an estimated loss of $500,000. As most of the pack of canned salmon had been shipped, loss of the finished product was small. Other recent fire losses include: Snow Hill Canning Co., Snow Hill, Md., with damage of approximately $100,000; Springbrook Canning Co., Springbrook, Ore., damage, $70,000; The Whiteland, Ind., plant of Stokely Brothers & Co., damage estimated at $350,000; Superior Olive Products Co., Visalia, Calif., damage of $75,000 at their Fresno, Calif., plant.

Schmidt Brewing Co., Detroit, has elected Frederic A. Rieg as first vice-president and Conrad E. Leppek as treasurer.

FRED W. HOFFMAN

Elected president of the Cudahy Packing Co., on September 15, Fred W. Hoffman succeeds E. A. Cudahy, who becomes chairman of the board. The new president started as a messenger in the company's South Omaha plant in 1902. In 1921 he became general manager of the Salt Lake plant and has since served in like capacities at Jersey City, St. Paul and Boston.

DR. ELMER V. McCOLLUM

For his outstanding research on vitamins, Dr. Elmer V. McCollum, professor of biochemistry and head of the School of Hygiene and Public Health at Johns Hopkins University, has been presented the 1944 Borden Award in the field of nutrition. The award, $1,000 and a commemorative medal, administered by the American Institute of Nutrition, was presented in Washington.

Swift & Co., Chicago, expects to complete construction on its new research laboratory and model pilot plant at the company's plant in Hammond, Ind., in about three months. The new unit will serve as research headquarters for the 17 Swift food plants.

W. A. BOWEN

Birds Eye-Snider, Inc., has named W. A. Bowen as national sales manager. He moves up from sales manager of the company's central division. C. D. Suydam succeeds Mr. Bowen while R. E. Garside takes over Mr. Suydam's former duties.

PERSONNEL

A. Richard Baldwin, senior research fellow in biochemistry under a grant from the Nutrition Foundation, Inc., at the University of Pittsburgh, is now with Corn Products Refining Co., Argo, Ill.

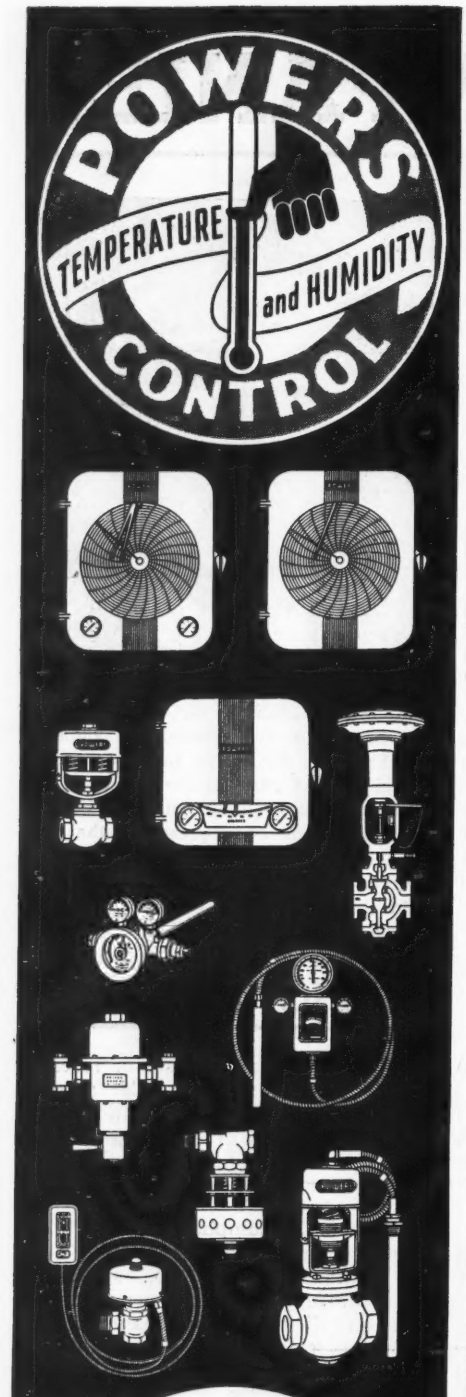
Grant J. Camphausen has been named manager of the Detroit office of National Biscuit Co., succeeding Paul R. Geyer, who has been appointed assistant district sales manager in New York.

V. Christianson, formerly manager of laboratories, Bowman Dairy Co., Chicago, has been made director of laboratories to succeed W. D. Dotterer, deceased.

Rowland J. Clark, formerly chief chemist of Shellabarger Mill & Elevator Co., is now with W. E. Long Co., Chicago.

John Charles Garey was recently appointed to direct the research and production program on a new nutritional yeast by the Red Star Yeast & Products Co., Milwaukee, Wis. He was formerly with Hiram Walker & Son, Peoria, Ill.

Charles W. Griffin, Jr., has been elected to the board of directors of the California Packing Corp., San Francisco, to fill the vacancy caused by



When you want accurate and dependable automatic temperature or humidity control for Industrial Processes, Heating or Air Conditioning Systems, call in a Powers engineer. With over 50 years of experience and a very complete line of self-operating and air operated controls we are well equipped to fill your requirements.

Write for Circular 2520

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Offices in 47 Cities—See your phone directory.

THE
POWERS REGULATOR CO.

the death of H. G. Richards. He is operating manager of the dried fruit department.

Dr. Charles S. Hanes, who has been serving as scientific advisor to the British Food Mission in Washington, will soon return to Great Britain to take over his duties as director of food investigation, Department of Scientific and Industrial Research. Dr. John Lovern, who in peacetime is a member of the research staff of the Torry Research Station, Aberdeen, Scotland, but who has been working with Dr. Hanes for the past year, will remain in Washington as scientific member of the British Food Mission.

A. G. Harmeier has been appointed vice-president in charge of grocery manufacturing for Sprague-Warner-Kenny Corp., with headquarters in Chicago.

William L. Heald, former chief chemist for the Colorado Mill & Elevator Co., Denver, Colo., recently joined the Shellabarger Mill & Elevator Co., as chief chemist.

Almon G. Hovey, formerly at the University of Minnesota, has been made head of the New Chemical Development Section of General Mills, Inc., research department, Minneapolis.

H. S. Looper, for 28 years manager of Great Western Sugar Co.'s plant at Fort Collins, Colo., retired recently and will be succeeded by Ralph L. Partridge former plant manager at Windsor, Colo.

L. H. McLaren, formerly of Michigan Bakeries, Inc., Grand Rapids, Mich., is production manager of the National Tea Co. bakery in Chicago.

Paul Mozingo and S. V. Johnston have formed a partnership as food brokers and manufacturers' agents in Indianapolis, under the firm name of Johnston and Mozingo. Both were formerly with Stokely Brothers & Co., Inc., Mr. Johnston as sales manager and Mr. Mozingo as head of government sales.

Carlis H. Neafus has been appointed manager of the advertising sales promotion department of Sun Maid Raisin Growers Association, Fresno, Calif., filling the vacancy left by the resignation of Hunter L. Scott.

H. W. Prentis, Jr., president of the Armstrong Cork Co., Lancaster, Pa., has been elected a director of the Borden Co.

George C. Spitzmiller, vice-president in charge of sales, and Harold B. Biedt, vice-president in charge of production, have been elected to the board of directors of the Best Foods, Inc.

DEATHS

Dwight L. Armstrong, 50, vice-president of the Armstrong Cork Co., September 10, at Lancaster, Pa.

Frank B. Bratek, 53, general superintendent for Swift & Co., September 19, in Chicago.

Francis King Carey, 86, chairman of the board of the National Sugar Mfg. Co., October 1, at Baltimore, Md.

Bernard Lichtenberg, 52, general manager of the Brewing Industry Foundation, and president of the Institute of Public Relations, October 3, in New York.

George L. Ringel, 66, vice-president and director of Fritzsche Brothers, Inc., New York, October 3, at Columbus, Ohio.

Raymond D. Robinson, 75, until three years ago superintendent of all California Packing Corp. holdings in California and oldest employee of the organization in years of service, September 24, at Fresno, Calif.

Jacob Rudel, 91, founder of the San Gabriel Winery near Los Angeles, September 28, in San Gabriel.

Christian H. Wieland, 64, formerly a partner in the Wieland Dairy Co., October 2, at Chicago.

STABILIZERS
WATER SOLUBLE GUMS
TRAGACANTH • LOCUST (CAROB) • ARABIC • KARAYA
IRISH MOSS
QUALITY CONTROLLED FOR UNIFORMITY IN YOUR PRODUCT
S. B. PENICK & COMPANY
IMPORTERS • CHEMICAL MANUFACTURERS • MILLERS
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735 W. Division Street—MOHawk 5651, Chicago 10, Ill.

ASSOCIATED INDUSTRIES

American Can Co. has purchased a 28-acre tract at Salem, Ore., and will build when priorities are suspended.

Allis-Chalmers, Milwaukee, Wis., has appointed Frank C. Angle as manager of all field sales offices of the general machinery division. He will continue to supervise operations of the Pacific region where he has been manager of sales activities.

Bound Brook Oil-less Bearing Co., Bound Brook, N. J., and Divine Bros. Co., Utica, N. Y., have been awarded a fourth Army-Navy "E" which entitles them to a third white star on their achievement pennant.

Continental Can Co., Inc., during the last month, took over the Owens-Illinois Can Co. and the Mono Service Co. The latter is a pioneer manufacturer of paper hot drink cups and paper food containers, of Newark, N. J. The can company was a subsidiary of Owens-Illinois Glass Co. The consideration in acquiring the Mono Service was stated to involve approximately $3,000,000. No price was indicated in the can company acquisition.

Crane Co. has appointed Lucien W. Moore as manager of the valve and fitting sales department with headquarters and general offices in Chicago. He was formerly general purchasing agent of the company.

Crown Cork & Seal Co., Baltimore, has announced that a branch factory will be established in Atlanta as soon as possible after the war.

Emulsol Corp., Chicago, has appointed E. S. Thayer as sales manager of the Technical Products Division. He was formerly assistant western district sales manager of the Mathieson Alkali Works, Inc., Chicago.

Omega Machine Co., a division of Builders Iron Foundry, has moved its factory and offices from Kansas City to Providence, R. I. L. E. Harper, president of Omega, will make his headquarters in the company's Chicago office.

Parker Rust Proof Co. announces the resignation of its president, Willard M. Cornelius, to become chairman of the board, and the election of Van M. Darsey, technical and service director, as president.

H. K. Porter Co., Inc., Pittsburgh, has opened offices in Los Angeles. Harold A. Hintz has been appointed district manager for the territory.

Safety Car Heating & Lighting Co. has transferred the sales office of the Entoleter Division from New York to the plant and laboratory at New Haven, Conn.

Bottles, Jars, Jugs, Ampoules, Vials, Pints, Quarts, Gallons.
Body Labels, Front and Back Labels, Neck Labels, All 'Round Labels, Foil.
Semi-Automatic, Full Automatic, Rotary, Straightaway, Turret.

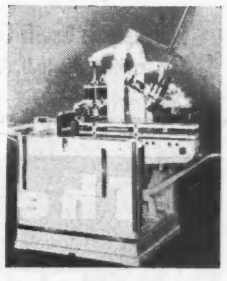
HOW TO CHOOSE THE BEST LABELER IN THE *WORLD*

for your particular Container and Label set-up

The WORLD Model S Semi-Automatic Labeler

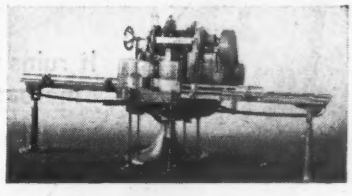
There are all kinds of Labelers for all kinds of labeling jobs and all kinds and sizes of containers. What's one packager's meat may be another packager's poison.

Isn't it good common sense to place your particular labeling problem in the hands of WORLD labeling headquarters—the only builders of Labelers that make the complete range, and can therefore make recommendations that are entirely unprejudiced.



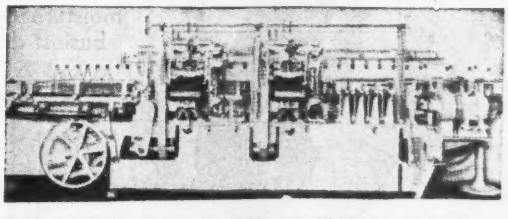
The WORLD Automatic TURRET Labeler

There's nothing difficult about planning, now, to get the best labeling in the WORLD. We'll gladly work it out for you, given a few facts about your production, your containers and your labels. Why not get this part of your planning job cleaned up? Simply get in touch with our nearest office.



The WORLD Automatic ROTARY Labeler

WORLD LABELERS



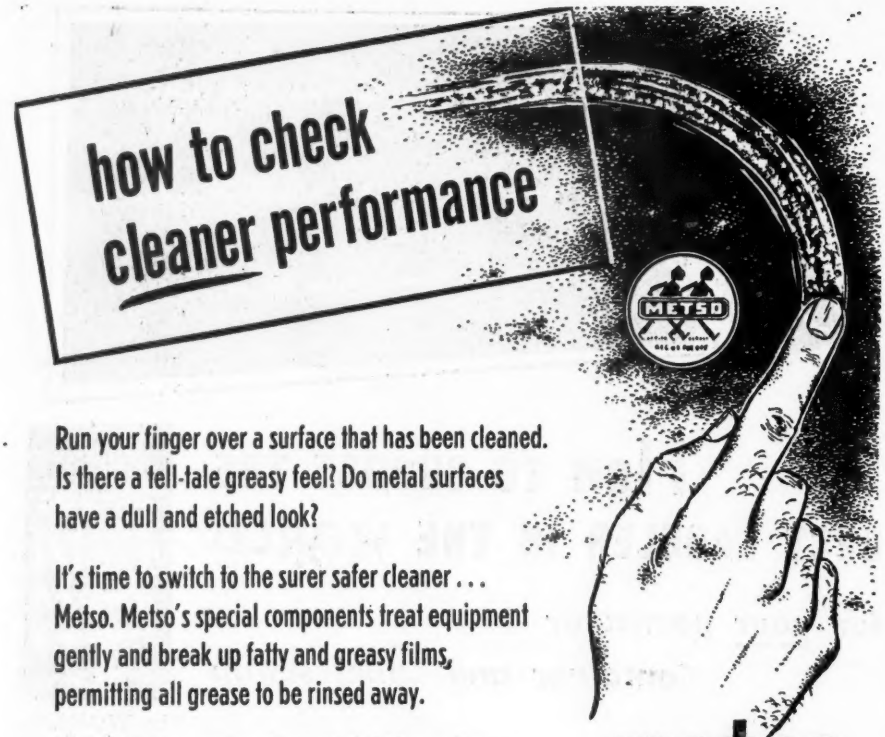
The WORLD Automatic BEE-LINE Straightaway Labeler

ECONOMIC MACHINERY COMPANY

Builders of World Automatic and Semi-Automatic Labelers for Every Purpose

Worcester, Massachusetts

NEW YORK PHILADELPHIA PITTSBURGH CHICAGO SAN FRANCISCO DENVER LOUISVILLE
SALT LAKE CITY EL PASO SEATTLE PORTLAND LONDON MONTREAL TORONTO WINNIPEG
SPOKANE VANCOUVER SYDNEY, AUSTRALIA WELLINGTON, N. Z. SAN JUAN, P. R.



Run your finger over a surface that has been cleaned. Is there a tell-tale greasy feel? Do metal surfaces have a dull and etched look?

It's time to switch to the surer safer cleaner . . . Metso. Metso's special components treat equipment gently and break up fatty and greasy films, permitting all grease to be rinsed away.

Metso cleaning passes the most rigid inspection. Use Metso for a week and see the difference.

Philadelphia Quartz Co., Dept. D, 125 S. Third St., Phila. 6
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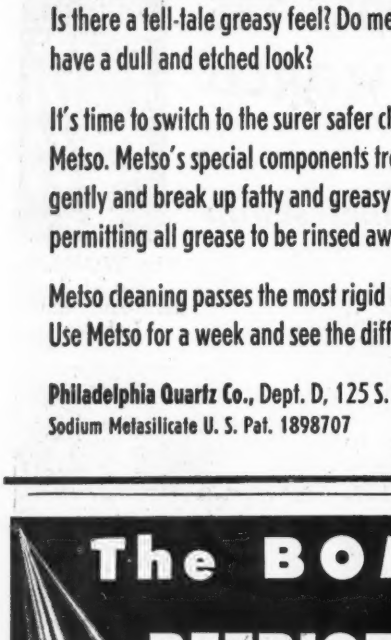
metso
Cleaners

The BOMB in your REFRIGERATED SPACES

is MOISTURE

It ruins your products, coats your coils with ice, increases refrigeration costs.

The opening in the
JAMISON VESTIBULE DOOR
is always closed unless filled with passing goods or men. It reduces refrigeration loss and moisture inrush to the minimum. Use it on busiest doorways.



JAMISON Cold Storage DOOR CO.
Jamison, Stevenson & Victor Doors
HAGERSTOWN MARYLAND
Branches in Principal Cities

JAMISON
BUILT COLD STORAGE DOORS

Stability of Fatty Foods

(*Continued from page* 80)

of its wide occurrence in many foods, there is no question about the edibility of lecithin. Because of its protective and emulsifying properties, it has been added to foods for a considerable period of time. When evaluated by any of the accelerated stability tests discussed previously, lecithin usually is less effective than many of the other antioxidants, particularly those of the phenolic type. Too little information is available to say whether lecithin is less effective under actual storage conditions. When used in conjunction with tocopherol or polyphenolic antioxidants, lecithin frequently enhances the stability beyond expected values. A disadvantage of lecithin in shortening fats is its tendency under certain conditions to cause darkening and foaming, particularly when used for deep-fat frying.

Concentrate of Tocopheroles in Vegetable Oils—A preparation consisting of 30 percent concentration of tocopherols in vegetable oil may be added as a preservative to lard and rendered pork fat in quantities up to 0.1 percent. Tocopherols, of which there are three, the alpha, beta and gamma, are probably the most important naturally occurring antioxidants in vegetable oils. They have nutritional significance, particularly the alpha variety, which is vitamin E. They are readily soluble in fats and oils and are effective antioxidant substances, particularly when used with a partly hydrogenated substrate or in conjunction with an acidic-type antioxidant. Most vegetable oils contain significant amounts of tocopherols, and as a result have greater stability than animal fats of similar iodine value. Further addition of tocopherol to vegetable products usually results in only small increases in stability.

Insofar as we are aware, such a concentrate is prepared commercially at present only by the application of a molecular distillation process to tocopherol-bearing oils. Work recently reported from the Southern Regional Research Laboratory[18] indicates that such concentrates can be prepared by low temperature crystallization technics.

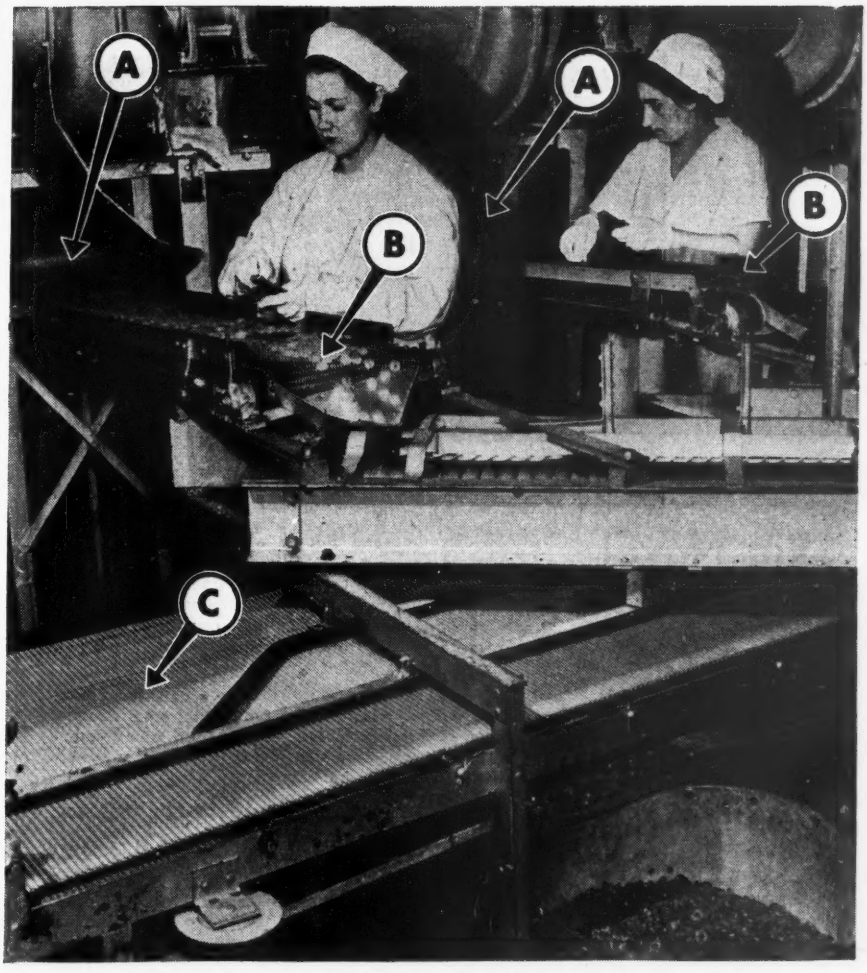
Nordihydroguaiaretic Acid (N. D. G. A.)—This phenolic substance and its antioxidant action has been discussed by Lundberg, Halvorson and Burr.[19] These investigators have stated that it is readily obtained in substantial yield from

Larrea divaricata (one of several plants known as creosote bush) and that it compares favorably with other highly effective inhibitors of the phenolic type. They further report that the protective effect is to some extent carried over into baked products.

Other Antioxidants — Many antioxidants, in addition to those approved by the Meat Inspection Division, have been disclosed in the literature. A few that have attracted considerable attention will be discussed briefly. In general, the polyphenolic compounds that have hydroxyl groups in ortho or para relation to each other are most effective; as examples may be mentioned hydroquinone, 1,2,4-hydroxyhydroquinone, gallic acid and its esters, pyrogallol, catechol and dihydroxynaphthalenes. It is hardly possible to give an accurate comparison of the relative effectiveness of these antioxidants because there is no suitable basis at present for a quantitative interpretation of results reported by different investigators. It should be emphasized, moreover, that much more practical work is required before any conclusions can be drawn as to the suitability of these compounds as antioxidants for edible products.

Mention has previously been made of a 30 percent concentrate of tocopherols in vegetable oil. It has been shown also that a substantial increase in stability of animal fats, such as lard, can be achieved without necessitating any costly isolation or concentration of the tocopherols, merely by the addition of about 5 to 10 percent of tocopherol-bearing oils or their hydrogenated products. Synthesized compounds similar to tocopherol, hydroxychromans and related compounds have been found to be effective antioxidants.[20]

Another class of compounds, at times referred to as acidic antioxidants, has aroused considerable interest in recent years. Among the better known of these may be mentioned phosphoric acid and some of its esters, ascorbic acid, fatty acid monoesters of ascorbic and iso-ascorbic acids, citric and tartaric acids, and many other hydroxy carboxylic acids. When added to substances containing tocopherol or an antioxidant of the polyphenolic type, these acidic substances seem to enhance or reinforce the antioxygenic action, with the result that greater increases in stability, as determined by the usual rapid tests, are obtained than would be expected from



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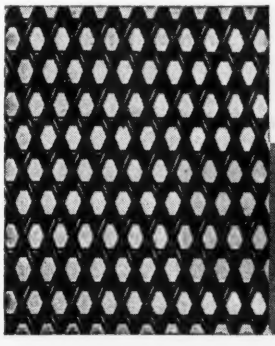

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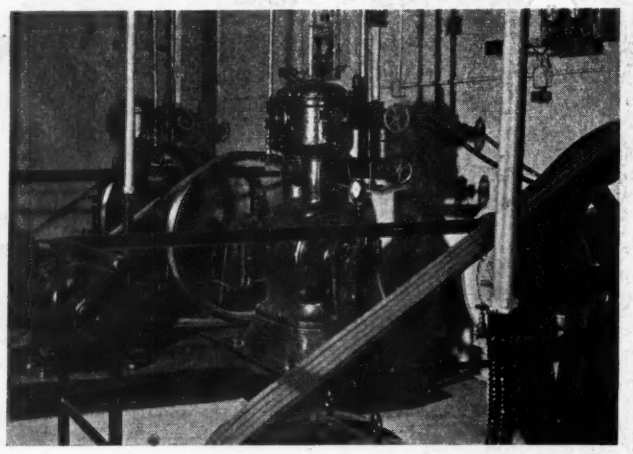

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a summation of the effects of each used alone. As would be expected, such synergists usually are especially effective when added to the tocopherol-bearing vegetable oils or their hydrogenated products. There seems to be some question as to whether these acidic substances should be considered as antioxidants, because they show little or no protective effect when added to fat or fat esters that have been treated to remove natural antioxidants normally present. Hence, the term *synergist* may be more properly applied. It has not been determined whether this synergistic effect, noted in rapid tests, has real significance under actual storage conditions or whether this apparent protective effect carries over into baked goods. Many of these compounds undergo decomposition at high temperatures, particularly at deep-fat frying temperatures, and cause darkening of the fat.

The use of special flour, or of an extract of cereal flours, may have advantages, particularly in certain foods. It has been suggested for example, that the flour may be incorporated with fat to be used as shortening for baked goods or added directly to such products as margarine, ice cream and salad dressings. It is claimed also that parchment paper into which such flour has been incorporated retards the development of rancidity when used for wrapping fatty foods.

It should be emphasized that even the best antioxidant should not be regarded as a cure-all. It will not make a poor product into a good one nor will it cover up the effects of mishandling and careless processing. The amount or proportion of antioxidant to use in a given product is important. If too much is used, off-flavors and odors may frequently be detected long before the characteristic rancidity develops. The amount of antioxidant used should be the minimum needed for a reasonable storage or shelf life of the product. Progress in the practical solution of the problem of rancidity in any product will undoubtedly result from continued research on processing technology, on application of antioxidants and on packaging.

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Sweet Orange Oil

(Continued from page 88)

sents an orange distillate or orange brandy containing about 50 percent alcohol which is consumed as such on the local market or employed for all kinds of alcoholic cordials. Proper aging would undoubtedly result in a very pleasant product which, because of its characteristic top note should be interesting also to the North American liqueur manufacturers.

Yield of Oil

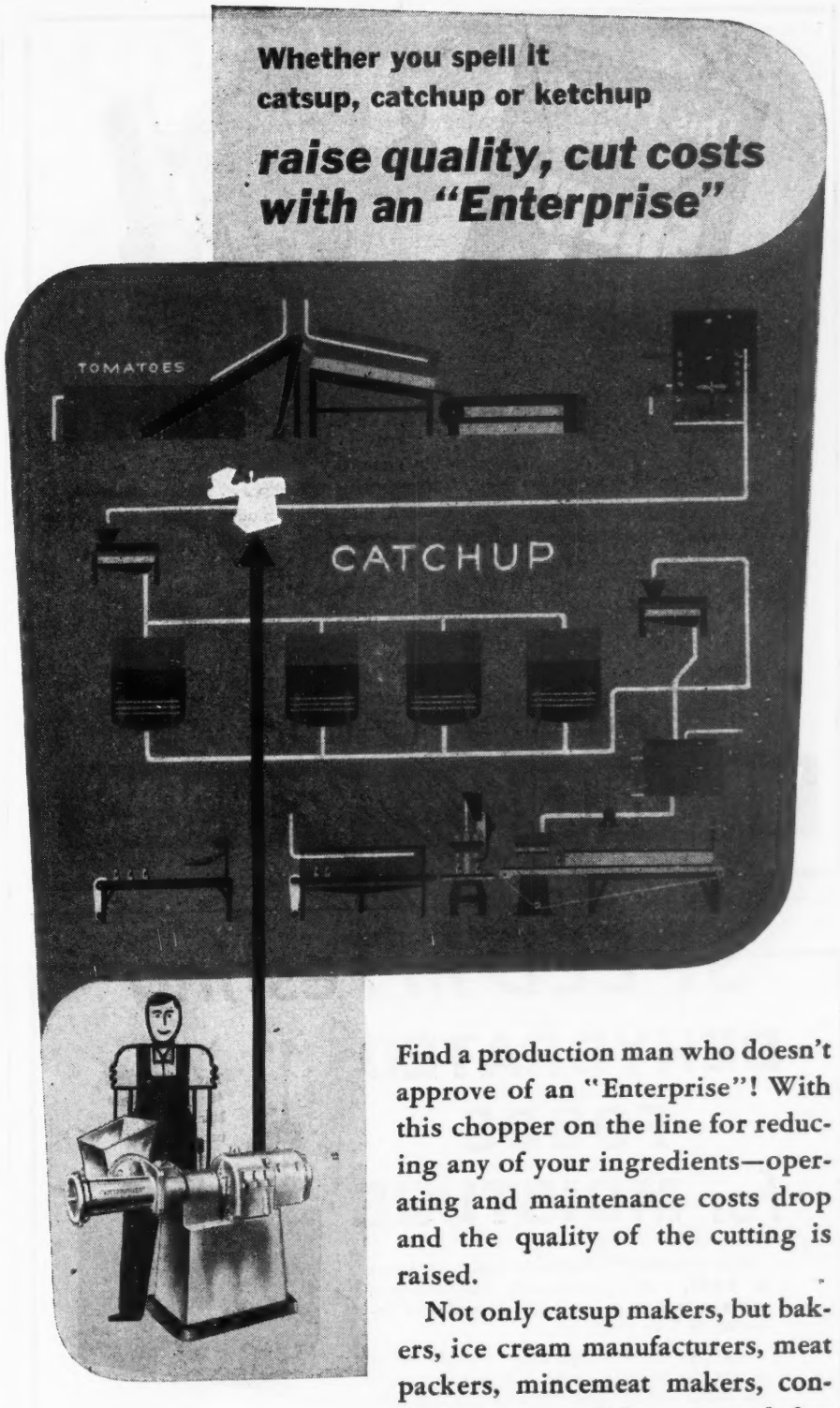
According to information gathered by the author in Brazil, the yield of orange oil varies from 3 to 5 kilos, on the average around 4 kilos, per ton of fruit. At the beginning of the harvest, when the fruit is firm and green, the yield of oil amounts to about 0.5 percent, but it may fall to as low as 0.25 percent towards the end of the harvest when the fruit becomes mature and too soft for complete recovery of the oil.

Physico-Chemical Properties

The physico-chemical properties of Brazilian orange oil, like those of all orange oils, change in the course of the harvest. As the fruit matures, the evaporation residue increases while the optical rotation decreases. The Bolsa de Mercadorias de Sao Paulo, Laboratorie de Tecnologia[1] reports the properties presented in Table I.

From these tables, it also appears that the evaporation residue is generally higher in the oils obtained

[1] Oleo de Laranja, Sao Paulo, 1942, 30.



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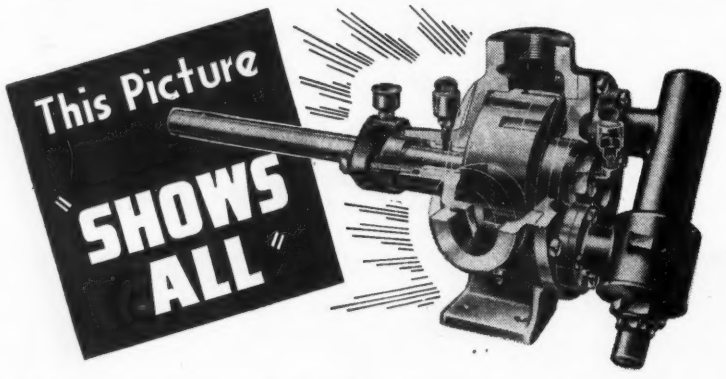

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by decanting the oil-water emulsion than in centrifuged oils.

During 1942, the Laboratorio da Seccao de Fiscalizacao de Adubos e outros Produtos Agricolas, da Divisao de Fiscalizacao e Classificacao de Produtos Agricolas do D.P.V. da Secretaria de Agricultura[1] analyzed 238 samples of Brazilian orange oils made from Baia oranges and obtained the following results:

Specific gravity at 25°	Minimum,	0.8416
	Maximum,	0.8470
	Average,	0.8435
Optical rotation at 25°	Minimum,	+93°52′
	Maximum,	+97°58′
	Average,	+96°17′
Refractive index at 20°	Minimum,	1.4719
	Maximum,	1.4738
	Average	1.4729
Evaporation residue	Minimum,	1.00%
	Maximum,	6.41%
	Average,	2.90%

Genuine Brazilian orange oils examined by Fritzsche Bros., Inc., New York, in the course of the last few years, had properties which varied between these limits:

Specific gravity at 25°.....0.842 to 0.847
Optical rotation at 25°....+95°0′ to +97°52′
Refractive index at 20°.....1.4723 to 1.4747
Aldehyde content, calculated as decyl aldehyde (hydroxylamine method) .....0.5 to 2.2%
Evaporation residue .....2.2 to 4.8%

The physico-chemical properties of the various lots of Brazilian orange oil show considerable variations. Occasionally, the specific gravity is above the limit prescribed by the U.S.P. XII (0.842 to 0.846) which is due to a high evaporation residue. The refractive index, too, occasionally exceeds that of the U.S.P. XII (1.4723 to 1.4737) which must be ascribed to the old age of the lot in question. Neither is the color of Brazilian orange oil uniform; it ranges from pale yellow to green.

[1] Ibid., 32.

Chemical Peeling

(*Continued from page 77*)

creased production at existing temperatures, or (*b*) temperature reduction, or (*c*) lower caustic concentrations

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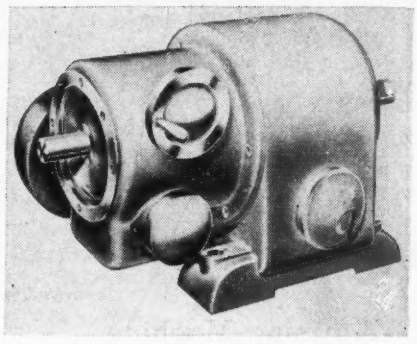
FOOD EQUIPMENT NEWS

Multi-Louvre Dryer

DESCRIBED as a compact, fully inclosed unit, containing moving louvres supported on power-operated endless chain, a new multi-louvre dryer has been introduced by Link Belt Co., 300 West Pershing Rd., Chicago. This particular dryer has been designed for low-cost drying or cooling of bulk materials which do not require long retention.

The mixing action and contacting of the material with the heated air introduced into the unit are said to promote efficient operation and assure a uniformly dry material. The air which is drawn into the moving mass of material and exhausted at the top of the dryer can be heated to the temperature best suited to the material being dried. Ample space between louvres permits air circulation at low velocity.

The principle of passing air through a constantly mixed bed of material permits the use of relatively high temperatures without danger of overheating, and results in rapid drying with none of the detrimental effects of forcing air into a dryer at high temperature and high velocity. Fine materials can be carried on the louvres without clogging, it is said. The louvre supporting chains are not in the path of the heated air; neither do they come in contact with the material being dried.



Variable-speed drive.

Variable-Speed Drive

IN the variable-speed drive announced by Lombard Governor Corp., Ashland, Mass., the V-belt serves principally as a control element, rather than for both drive and control. The primary speed reduction is accomplished by conventional gears, 90 percent of the power being transmitted through these gears and only 10 percent through the V-belt—a minimum load which avoids slippage. Because the variable-speed output shaft is concentric with the motor shaft, the unit has the advantage of a direct line drive. Remote control is available, with horizontally split casings optional. The gears are totally inclosed and run in oil.

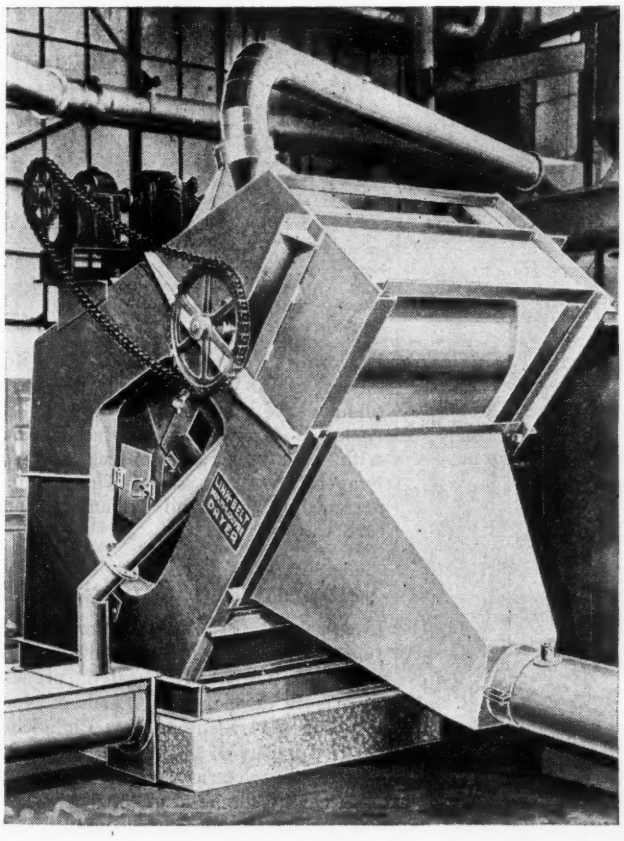
Electronic Controller

OPERATING on the shielding effect of a vane passing between two coils in an electronic circuit, a new line of free-vane electronic controllers is announced by Bristol Co., Waterbury 91, Conn. Recording and indicating models are available for automatic control of temperature, pressure, liquid level and humidity. These types of control operation are available: low or high open, low-high, low-open-high and low-normal-high.

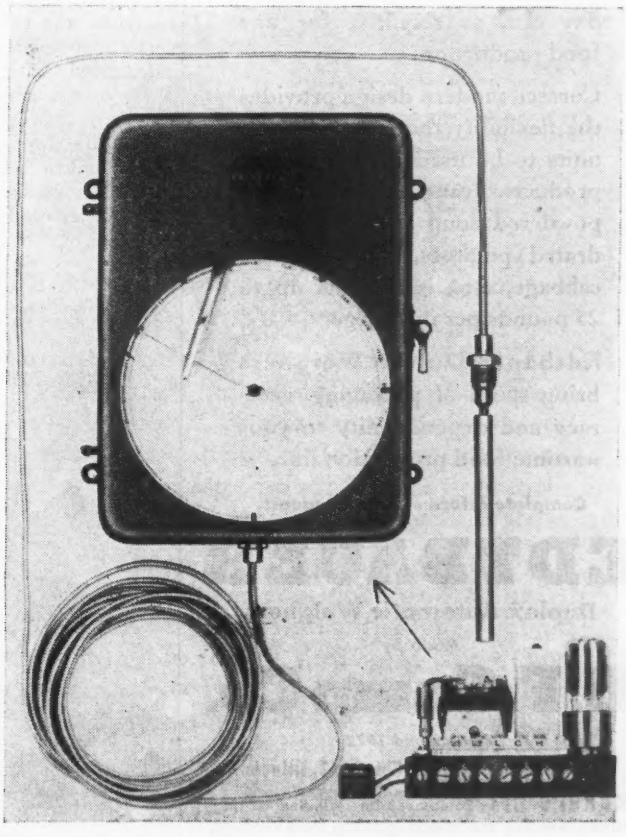
Instruments covering a temperature range of –125 deg. F. to 1000 deg. F. are offered for use in conjunction with motor and solenoid valves, relays, main-line switches and other fuel-control apparatus for regulating the temperature in electric, oil gas- and steam-heated ovens, dryers, dehydraters, oil baths, smokehouses, tanks and other industrial apparatus.

The pressure controller is available in a range extending from full vacuum to 6,000 lb. per square inch, and in addition is suitable for automatically controlling liquid level. The humidity controller operates from a wet and dry bulb element with a separate control for each bulb.

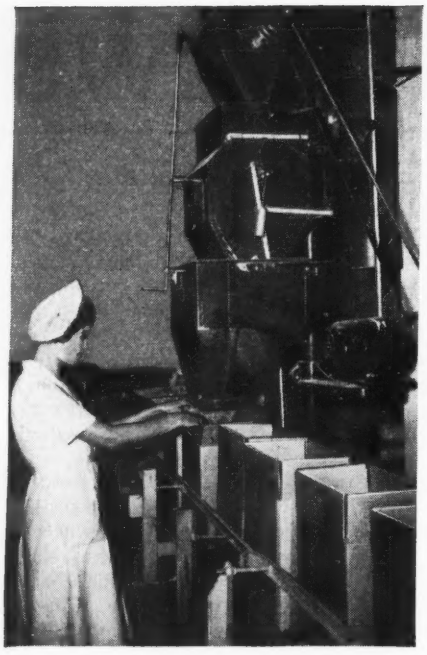
The electronic instrument also is supplied as a time-program controller for temperature, pressure, liquid level or humidity.



Multi-louvre dryer.



Free-vane electronic controller.



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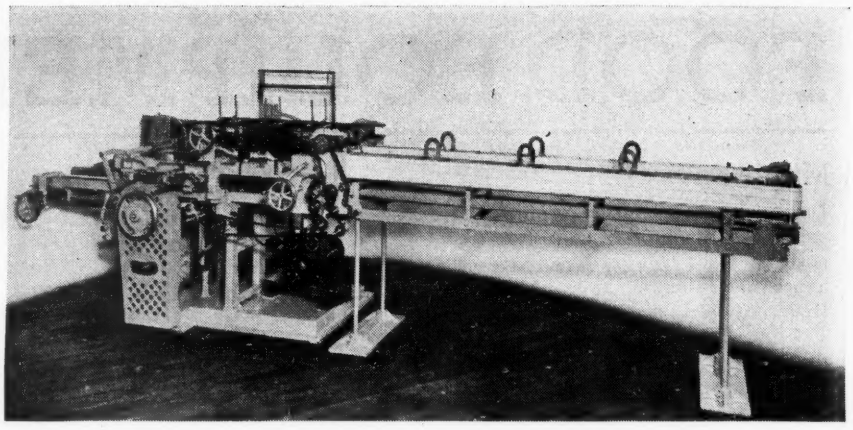


Improved wrapping machine.

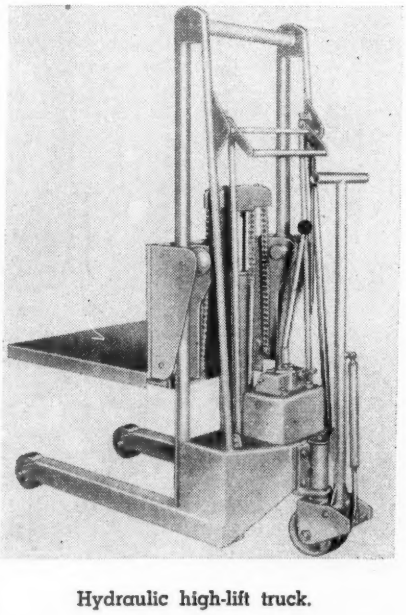
Wrapping Machine

AN improved model of a standard wrapping machine which will handle many different sizes of cartons is announced by Package Machinery Co., 152 W. 42nd St., New York 18. It is said to be quickly adjustable for any size of carton from one 14 in. long, 8 in. wide and 7 in. deep to one 5 in. long, 1½ in. wide and ½ in. deep. The machine has an automatic cutout and an electric eye for accurate registration of the wrapper. It will wrap the cartons in printed waxed paper or cellophane at the rate of 30 to 70 per minute, depending upon the size of the carton.

High-lift Truck

WHAT is said to be a definite departure in materials handling equipment has just been announced by Lyon-Raymond Corp., 1592 Madison St., Greene, N. Y. It combines the two basic principles of an easily manipulated lift truck and that of safe, speedy lifting or tiering equipment. It is comparatively light, weighing 495 lb., and is so designed that it will turn within its own length, and is equipped with Timken bearings.

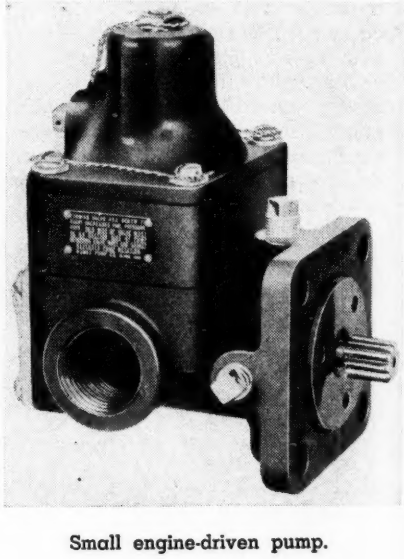
Special tubular and formed-steel construction is used. The truck has a floor lock and has a fingertip lowering device. The standard stock model, with a capacity of 1,000 lbs., has a 24 by 30-in. platform. The elevation range is 42 in. net.



Hydraulic high-lift truck.

Engine-driven Pump

ORIGINALLY designed for aircraft but adaptable to other applications for liquid handling, a new light weight, high pressure, engine-driven pump is announced by Romec Pump Co., 105 Abbey Road, Elyria, Ohio. Weighing only 2¾ lb., the pump delivers 400 gal. per hour at 2,500 r.p.m. It is said to be precision built, with balanced relief valves and low-temperature shaft seals. This pump is designed to withstand extreme temperature ranges.



Small engine-driven pump.

Temperature Controller

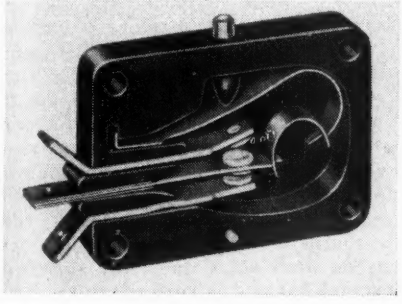
CONTROLLERS of the duration-adjusting type for closely regulating the temperature of electrically heated processes have been developed by Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44. By means of an "on-off" contacting system, the electric current is controlled to keep the temperature on the required control point or program. Input is either "full-on" or "full-off," and regulation is

obtained by controlling automatically the time during which current is either "on" or "off."

Employing the balance method both for measurement and control, this new system is a complete, coordinated one. It provides full proportional climb action, as compared with the more familiar full proportional positioning action, and it gives automatic droop correction. It can be equipped with overshoot control, valuable when the controlled process is coming up to temperature.

Small Snap Switch

REPORTED to be the smallest fully enclosed snap-action switch ever built, the new Miniac is only $\frac{17}{64}$ in. thick, $\frac{13}{16}$ in. high and $1\frac{3}{16}$ in. long. It was engineered on the well-known rolling-spring principle, with a new design and



Small snap switch.

smaller size, and is fully enclosed in a bakelite case. Actuation is with a stainless steel pin plunger. All parts are noncorrosive and all contacts are of fine silver. Main blade, contact blade and rolling spring are of beryllium copper, and the switch is rated at 15 amps., 115 volts, a.c. It is designed to permit leaf-type or overtravel-plunger-type actuators to be attached to the case. The switch is manufactured by the Acro Electric Co., Superior Ave., Cleveland 14, Ohio.

Floor Patching

RESISTANCE not only to direct impact and load, but to continuous vibration, abrasion and other effects of traffic, is claimed for a collodial-composition floor patching material made by Continental Asbestos Refining Corp., 1 Madison Ave., New York.

Another characteristic of the material is that it is self-healing. Small holes, such as those left when machines or fixtures are removed, disappear under traffic. Patches laid on Saturday are ready for traffic on Monday. Any handy man can apply the patching, the manufacturer states. Adhesives or bonding agents are not required.

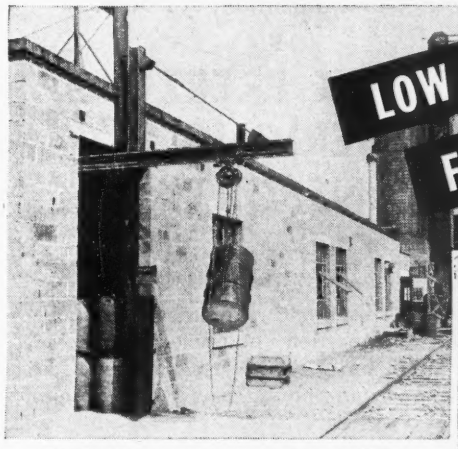
Hard-faced Mill Knife

A METHOD of hard-facing sugar cane mill knives to lengthen their efficient cutting life has been developed by Haynes Stellite Co., Kokomo, Ind.

$1140.00

AMERICAN MONORAIL SYSTEM INSURES

LOW COST HANDLING
FIRE PROTECTION
ORDERLY STORAGE



Swinging jib removed drums from trucks allowing passage to crane in oil house.

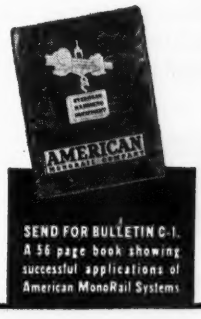
Storage crane with built-in switch allows passage of drums through fire door.

Special crane carries drums across switch to track in dispensing room.

All handling of oil drums through storage and dispensing is done systematically at greatly reduced cost.

This installation represents only a small investment. At a cost of only $1140 the system includes a standard jib crane which interlocks with a special bridge crane inside the oil house. This crane carries a built-in switch permitting passage of hoist to a curve connecting through the fire door to the single track loop of MonoRail around the dispensing room.

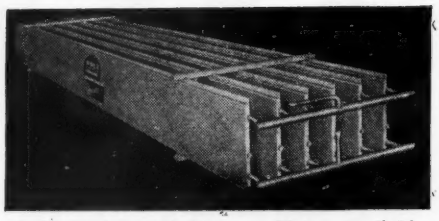
Here is another example of a low price system furnishing low cost operation of American MonoRail equipment. Let an American MonoRail engineer show you the answer to your troublesome handling problems at no cost to you.



SEND FOR BULLETIN C-1. A 56 page book showing successful applications of American MonoRail Systems

THE AMERICAN MONORAIL CO.
13125 ATHENS AVE. • CLEVELAND 7, OHIO

DOLE
Vacuum Plate REFRIGERATING UNITS



Dole Locker and Storage Plates Available in different sizes.

Assure desired temperatures and maximum comfort.

for

- QUICK FREEZING
- PRESERVING
- TRANSPORTING

FOOD

Quick Freeze Plate Unit Available in different sizes.

Dole plates are used and recommended by outstanding Refrigeration equipment manufacturers. Used by the Government for Cold Storage Rooms in the U. S. A. and Foreign Bases.

Write for Catalogs, Engineering assistance or a representative to call—no obligation

DOLE Vacuum COLD PLATES Maximum Refrigeration Efficiency for all REFRIGERATION PURPOSES

DOLE REFRIGERATING COMPANY
5910 N. Pulaski Rd., Chicago 30, Illinois
N. Y. Branch: 55 W. 42nd St., New York 18, N. Y.

FREDERICK HAS THE ANSWER . . . TO YOUR PUMPING PROBLEMS

When considering the installation of pumping equipment, it is highly advisable for the prospective purchaser to consult with our engineering department.

Give us this information—

What are the conditions under which your pumps must work?

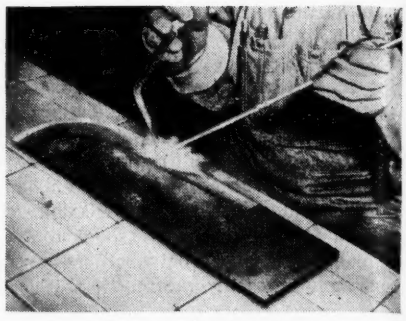
What kind of work must your pumps do?

With this data at hand, we will recommend a FREDERICK pump which, in design and operation will exactly meet your requirements.

For over 25 years we have been making fine pumps . . . in one plant alone over 800 of the particular type and make here illustrated are in use . . . one reason why we have the answer to **your** pumping problems.

THE IRON & STEEL CO.
Frederick, Maryland

"Over 25 Years' Experience in the Making of Fine Pumps"



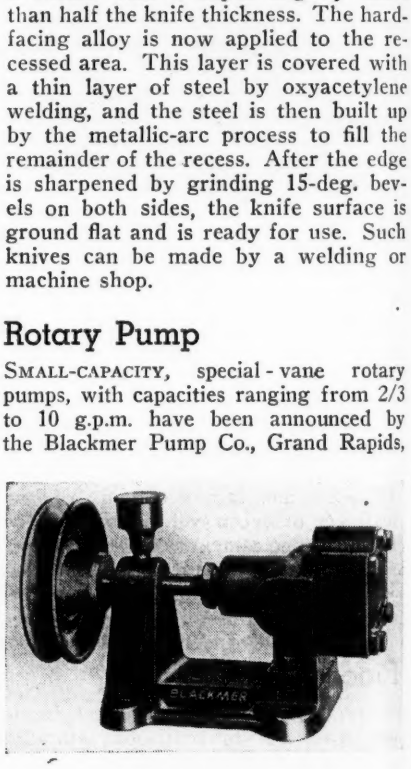
Putting a hard facing on a sugar cane mill knife.

Knives treated by the new procedure are said to stay sharp longer and to cut sugar cane very clean, eliminating sirup losses when cane is crushed rather than cut by a dull knife.

A blank blade is cut from steel plate, and the outer circular edge is rabbeted on a milling machine to provide a recess with a depth slightly more than half the knife thickness. The hard-facing alloy is now applied to the recessed area. This layer is covered with a thin layer of steel by oxyacetylene welding, and the steel is then built up by the metallic-arc process to fill the remainder of the recess. After the edge is sharpened by grinding 15-deg. bevels on both sides, the knife surface is ground flat and is ready for use. Such knives can be made by a welding or machine shop.

Rotary Pump

SMALL-CAPACITY, special-vane rotary pumps, with capacities ranging from 2/3 to 10 g.p.m. have been announced by the Blackmer Pump Co., Grand Rapids,



Small-capacity rotary pump.

Mich. These pumps are self-adjusting for wear, maintaining normal capacity throughout the life of the buckets, the manufacturer claims. The buckets are easily replaced when worn out.

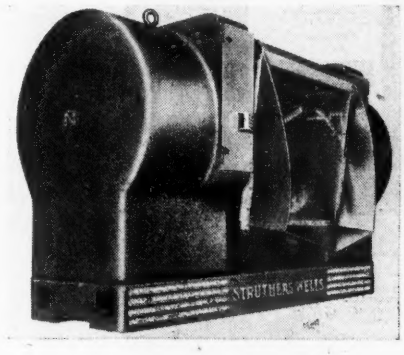
The pumps are available in iron, bronze fitted, or all bronze.

Mixing Machine

SEVERAL important advantages are claimed for a new batch mixing machine recently introduced by the Northmaster Division of Struthers Wells Corp., Titusville, Pa. By the use of a different form of mixing element, a notable improvement is realized in the performance of this machine. The action is due to improved mixing

blades in combination with a serrated saddle and a specially constructed mixing chamber which is said to minimize the tendency for moistened material to collect in the corners of the trough above the blades and escape treatment. The use of corner irons or large fillets to prevent pocketing is generally unnecessary in this new machine. This results in increased production and better quality, it is claimed. There also is an increase in jacket area through elimination of the large corner fillets formerly required.

The improved mixers are equipped with antifriction bearings, straddle-mounted driving gears, automatic lubrication systems and other features contributing to long life under continuous

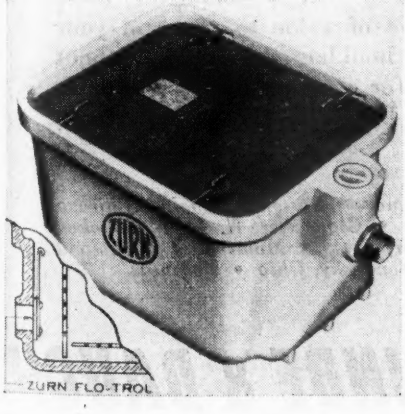


Improved mixing machine.

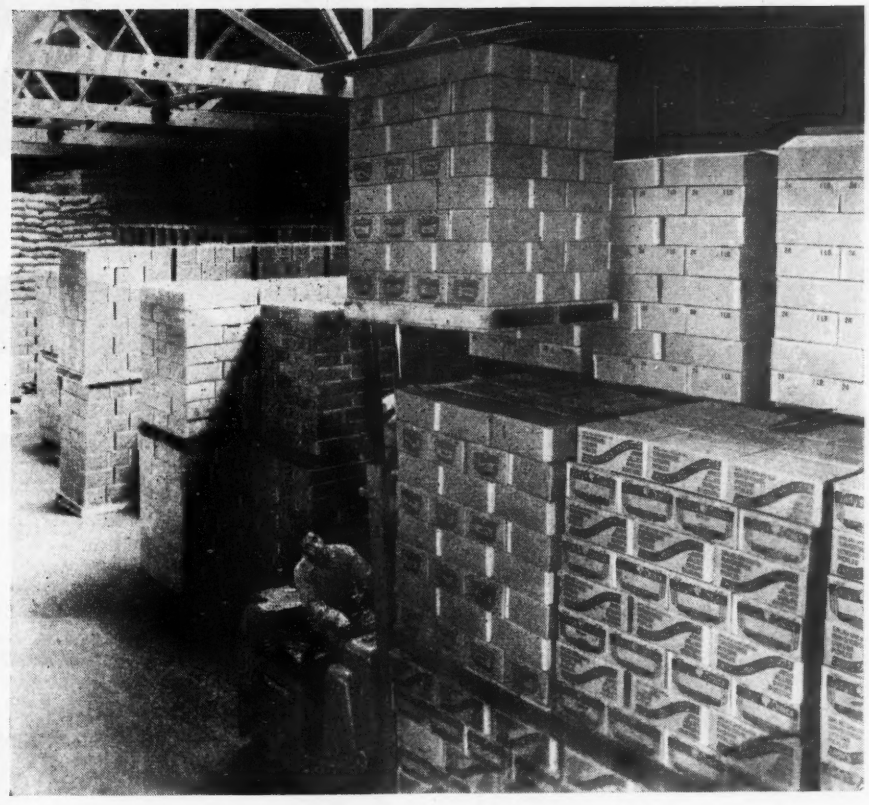
service conditions. Multiple V-belt, silent chain or direct-connected motors are optional. The machines are constructed of any commercial metal or alloy, and are available in sizes up to 4,000-gal. working capacity.

Grease Recovery Unit

GREASE in waste water may be intercepted for separation and recovery by the Zurn Greaseptor, which incorporates a new flow control feature designed automatically to prevent passage of waste water in a volume exceeding the rated capacity of the unit. Called Flo-trol, the new control is adjusted by the plumbing contractor and should require no further attention. The manufacturer is J. A. Zurn Manufacturing Co., Erie, Pa.



Grease recovery unit with water-flow control.



Every Towmotor Operator is a

DIRECTOR of POWER!

The man or woman seated at the controls of a Towmotor Lift Truck is a director, not a generator of power! Towmotor takes over the work burden, leaving manpower to control operations. And flexible Towmotor performs hundreds of handling assignments far beyond the practical limits of any amount of manpower.

Labor-saving materials handling equipment is equally as necessary as labor-saving production machinery IF loading, moving, storing and stacking operations are to keep pace with manufacturing and delivery assignments.

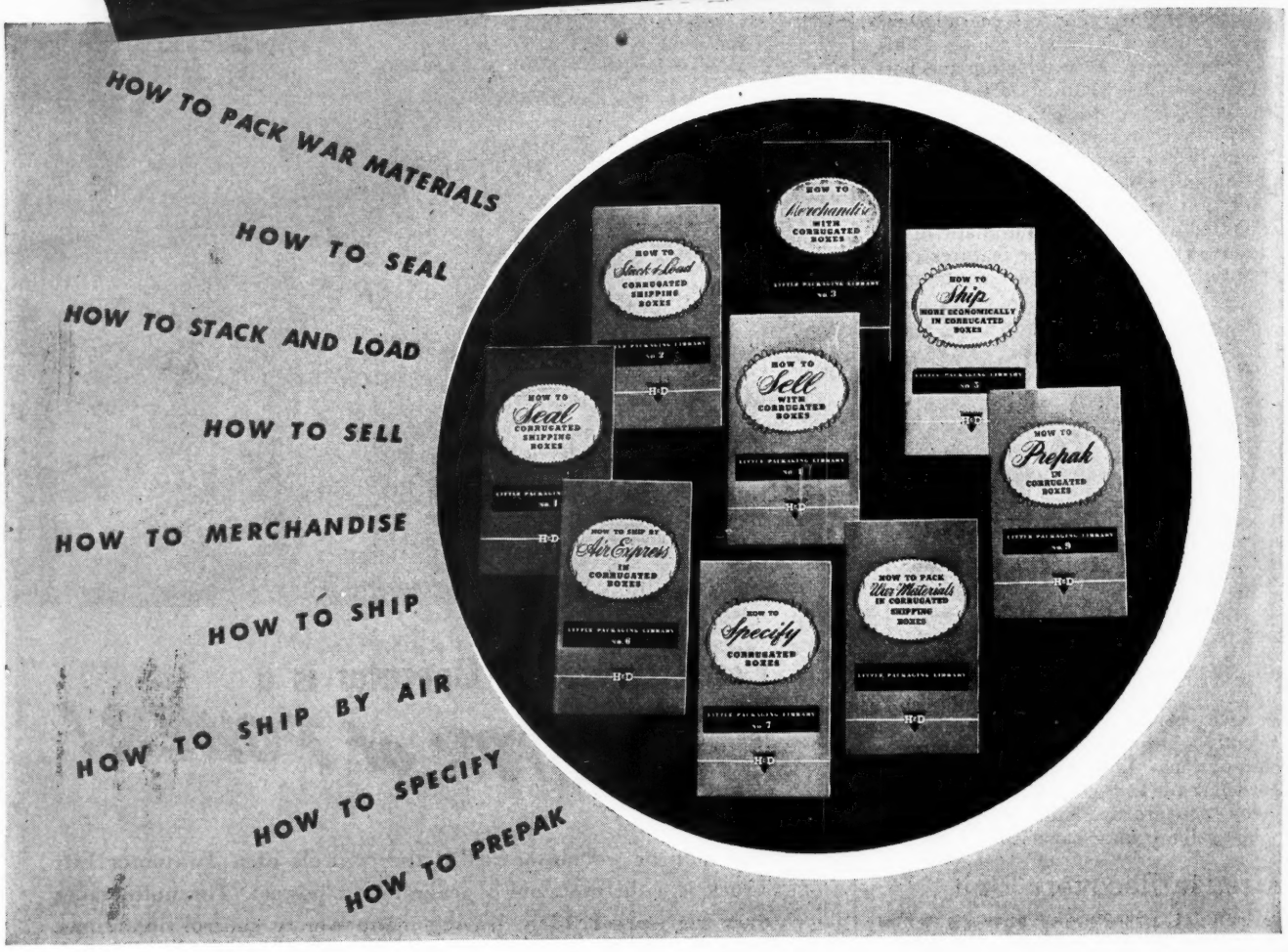
For savings in time, manpower and money try Towmotor—the one-man-gang. Powerful, speedy, easy to maneuver in cramped quarters, Towmotor lifts loads weighing as much as 10,000 pounds, moves them as fast as 880 feet a minute and builds stacks as high as 25 feet.

Get complete information. Write today to Towmotor Corporation, 1222 E. 152nd Street, Cleveland 10, Ohio, and ask for free copy of Towmotor "Data File."

TOWMOTOR

THE 24-HOUR ONE-MAN-GANG

9 WAYS TO BETTER POST-WAR PACKAGING


HOW TO PACK WAR MATERIALS
HOW TO SEAL
HOW TO STACK AND LOAD
HOW TO SELL
HOW TO MERCHANDISE
HOW TO SHIP
HOW TO SHIP BY AIR
HOW TO SPECIFY
HOW TO PREPAK
How to Stack & Load Corrugated Shipping Boxes
How to Merchandise with Corrugated Boxes
How to Ship More Economically in Corrugated Boxes
How to Seal Corrugated Shipping Boxes
How to Sell with Corrugated Boxes
How to Prepak in Corrugated Boxes
How to Ship by Air Express in Corrugated Boxes
How to Pack War Materials in Corrugated Shipping Boxes
How to Specify Corrugated Boxes

H & D Little Packaging Library—FREE on Request!

Packaging war goods — that's the all-important task of H & D today, BUT H & D's war-time activities are bringing a wealth of valuable experiences, and an abundance of new packaging skills and techniques that will have a great and good effect on the progress of post-Victory packaging.

With packaging trends constantly changing and packaging materials under continuous development, H & D published its Little Packaging Library to make your entire packaging procedure more efficient. The "Library" presents the packaging experience of hundreds of manufacturers and contains many real contributions to improved packaging and shipping methods; to savings in materials, manpower, machinery and transportation facilities.

Whatever your packaging assignments are today—whatever they will be tomorrow, these booklets will prove of value to you and your organization. The booklets are FREE without obligation—write for as many sets as you need. Address Hinde & Dauch, 4409 Decatur Street, Sandusky, Ohio.

• • •

FACTORIES: in Baltimore • Boston • Buffalo • Chicago Cleveland • Detroit • Gloucester, N. J. • Hoboken Kansas City • Lenoir, N. C. • Montreal • Richmond St. Louis • Sandusky, Ohio • Toronto

For postwar packaging..better see **H&D HINDE & DAUCH**

AUTHORITY ON PACKAGING . . . CORRUGATED SHIPPING BOXES

CATALOGS & BULLETINS

FOOD PLANT EQUIPMENT

Gear Reduction Units—Fan-cooled gear-reduction units are illustrated, and data on them are given, in Catalog No. 300 by Cleveland Worm & Gear Co., Cleveland, Ohio.

Cooling Towers—Small, double-flow, horizontal-draft, cooling towers for use with Diesel engines, gas compressors and refrigeration machinery are illustrated in 34-page Bulletin 700-A by Marley Co., Inc., Kansas City, Kan.

Spray Nozzles—Chain Belt Co., Milwaukee, Wis., has just produced a new 8-page folder describing Rex flat spray nozzles. Folder No. 459 describes and illustrates this one-piece, nonclogging, Venturi-throated, spray nozzle with side deflectors. The folder, besides illustrating and describing the nozzle, gives tabulated information concerning sizes made, liquor discharged per minute, material from which it is made and prices. Many applications also are pictured.

Ice-Making Equipment — Describing and illustrating plants of many types and sizes with capacities from a fraction of a ton of ice per day to 400 tons per day in a single station is a 32-page bulletin (127-G) just issued by Frick Co., Waynesboro, Pa. This catalog is profusely illustrated with photographs of actual installations, and it gives a detailed description in each case.

PLANT SUPPLIES

Pump Packing—How pump operators can benefit from repacking pistons is explained in a new booklet distributed by Darling Valve & Manufacturing Co., Williamsport, Pa. Pumping efficiency is increased by a tight seal between the piston and cylinder wall, this being attained with a composition repacking cup made by Darling.

V-belts and Sheave—Five different kinds of V-belts, each designed for a specific type of service, are discussed in Bulletin B6331 by Allis-Chalmers, Milwaukee 1, Wis. A new type of sheave also is described.

Flavoring—A wholesale price list of essential oils, vanilla, aromatic chemicals and other basic materials has been published by Dodge & Olcott Co., 180 Varick St., New York 14.

Detergent—Emulsept, a new potent odorless germicidal detergent for the food industry, is described in an 8-page bulletin (F) put out by Emulsol Corp., 59 E. Madison St., Chicago.

Decarbonator—Bulletin No. 2975 has been issued by Cochrane Corp., 17th & Allegheny Ave., Philadelphia 32, Pa. This leaflet describes Cochrane decarbonators for the removal of carbon dioxide gas in connection with iron removal plants and with the degasification of hydrogen zeolite softened waters.

MAINTENANCE

Automotive Maintenance Equipment—An 8-page booklet, "Tivit Automotive Maintenance Equipment," describing and illustrating a number of units which simplify cleaning operations and speed automotive maintenance, such as a portable spray tank, a tire matrix cleaning tank and a radiator and motor block flusher, has been published by Tivit Products Co., 8024 S. Vermont Ave., Los Angeles 44, Calif.

Plastic Coatings—Just off the press is a new catalog on Amercoat plastic coatings, prepared by American Pipe & Construction Co., P. O. Box 3428, Terminal Annex, Los Angeles 54. It is a 16-page illustrated catalog describing the many uses of Amercoat in a wide range of industries, including a comprehensive list of foods and beverages. Shown also are actual equipment and structures that are now being protected against corrosion.

Flooring—Heavy-duty, nonslip industrial flooring is described in a new 6-page bulletin, entitled "Emeri-Floor," published by Walter Maguire Co., Inc., 330 W. 42nd St., New York. The flooring is made with Cortland emery aggregate. This bulletin is illustrated in color and tells how floor maintenance costs may be reduced. It shows a flooring cross-section, gives flooring test curves for load and strength, presents a simple check chart for flooring selection, and tells how to make sure of a good flooring by test. Included in the bulletin are interesting data pertaining to industrial flooring in general.

Bottling Maintenance—A 6-page reprint, "Preventive Maintenance in the Bottling Industry," giving practical suggestions on how to prevent major breakdowns in production equipment found in bottling plants, is being distributed by George S. May Business Foundation 11 S. Dearborn St., Chicago 3.

CONTROL EQUIPMENT

Control Instruments—Two new bulletins have just been published by Bristol Co., Waterbury 91, Conn. Bulletin No. P1202 is a 12-page booklet covering the application, operation and design of radiation pyrometers. Bulletin No. A115 describes a new line of air-operated controllers known as the Model 93 series. It furnishes information about instruments for the control of temperature, pressure, vacuum, liquid level, humidity and flow.

Spout Magnet—Stearns Magnetic Mfg. Co., Milwaukee 4, has issued a new Bulletin 92-D, describing and illustrating its Class "AAA" spout magnet, widely used in the grain, milling and food industries.

Electronic Controllers—Bulletin DM009 describing free-vane electronic controllers has just been issued by Bristol Co., Waterbury 91, Conn. The bulletin describes controllers for pressure, liquid level, humidity and time programs.

MANAGEMENT

Business Engineering—George S. May Co., 122 E. 42nd St., New York 17, N. Y., has just issued a 16-page catalog on business engineering. It covers the service this company renders in problems concerning administration, operation and sales. The bulletin describes the facilities and gives a detailed description of the services that it can render in all of these fields.

Trade Barriers—The third edition of "Are the United States United?" brings up to date the latest information available toward eliminating trade barriers and adopting uniform minimum standards for sizes and weights of truck and trailers; published by Fruehauf Trailer Co., Detroit, Mich.

MISCELLANEOUS

Driver's Manual—Of value to truck owners, fleet superintendents and drivers is the 158-page "Driver's Manual," which recommends driving practices to help keep trucks in efficient operating order for their vital wartime transportation jobs. Such operations as correct starting procedures, road practices and the care of trucks are given in this booklet published by White Motor Co., Cleveland 1, Ohio.

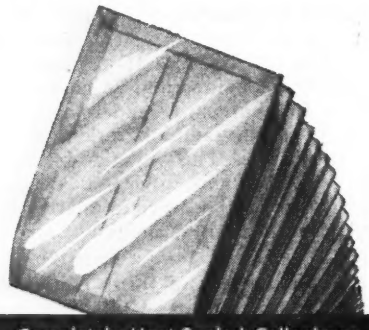
Frozen Foods

come *First!*

Yes! As a packer of frozen foods, you have prior claim on the finest, most efficient frozen food packages available ... Safety-Pack ... the ultimate in preservation of the flavor, appearance and moisture content of your frozen foods.

In recognition of the importance of the 1944-45 food crop, we have turned over to you every available facility during the critical harvesting period. No effort will be spared to see that your orders for completely heat-sealed Safety-Pack cellophane bags are shipped promptly.

Safety-Pack will insure your products against deterioration and do its share to help the nation through the toughest winter of the war.



Completely Heat-Sealed Cellophane
FROZEN FOOD BAGS
Single Wall or Duplex—Flat or Square

ALL bags are custom-designed to meet your own specifications for moisture-vaporproof qualities and shelf appeal. Printing one to four colors when desired.

CONTINENTAL BAG SPECIALTIES CORP.
WAR-TESTED PACKAGING

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2736 EAST 12 STREET LOS ANGELES, CALIF.

BUY MORE WAR BONDS NOW!

BOOKS

Tax Recommendations

PRODUCTION, JOBS AND TAXES. By Harold M. Groves. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, 1944. 116 pages; 5¾x9 in.; cloth. Price, $1.25.

In conformity with its plan to provide a well-rounded analysis of the economic problems involved in attaining and maintaining new high levels of production after the war, the research committee of the Committee for Economic Development offers this study. According to the author, who is a professor of economics at the University of Wisconsin, the report summarizes the major findings of part of a larger study of taxation and incentives.

The book offers 20 major recommendations and conclusions designed to bring about vitally necessary high levels of production and employment in the coming peacetime. The importance of a sound program can be partially appreciated when it is realized that reasonable estimates of postwar Federal expenditures will amount to some $20,000,000,000 annually. This is more than double the 1939 expenditure of $9,000,000,000 and is staggering when compared with the maximum tax-raising achievement of any peacetime year — that of $6,000,000,000 in 1938.

While our tax system is currently producing $42,000,000,000, much of it is of an emergency character, superimposed on the old structure. Obviously an overhauling is in order.

Barley Research

INDUSTRIAL EVALUATION OF TWO BARLEY VARIETIES GROWN IN 1943. Published by Malt Research Institute, Madison, Wis., June, 1944. 48 pages; 7x10 in.; paper.

This is the fourth annual report of its kind and gives the results obtained on the two standard barley varieties, Oderbrucker and Wisconsin Barbless, grown in 1942.

The evaluations include the yield of barley and the general quality of the varieties grown in two locations in Wisconsin, the comparative malting qualities of the two varieties and the suitability of the malts from the two varieties for processing in the brewing, distilling and food industries.

Electronics for Beginners

A PRIMER OF ELECTRONICS. By Don P. Caverly. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, 1943. 235 pages; 5½x8 in.; cloth. Price, $2.

This little book is addressed to those who know little or nothing about electricity and electrical equipment. A deliberate effort has been made to remove complex technical aspects in which electrical engineers and physicists must deal. The result should give the average person a basic understanding of how electronic apparatus works, and it will give nontechnical handlers and operators of such equipment a clearer understanding of their job.

Eating Habits

FAMILY FOOD CONSUMPTION IN THE UNITED STATES. Published by the Department of Agriculture as Miscellaneous Publication No. 550, 1944. 157 pages; 5⅞x9⅛ in.; paper. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. Price, 20 cents.

This study presents a picture of family food consumption in the United States in the spring of 1942. The war economy, which had already set in, was strongly influencing food habits.

The report discusses the quantities of food of all kinds that were being consumed by civilian housekeeping families and single persons, along with the nutritive value and the money value of this food. The tables offer a complete breakdown of the data compiled from a cross section of the population, embracing 126,138 persons.

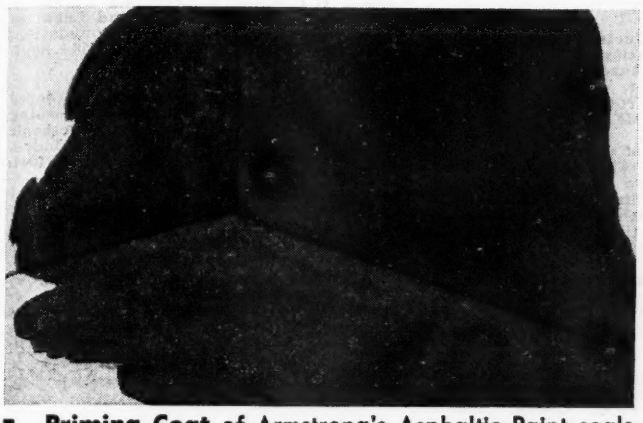
FOUNDED FRL in 1922

"Laboratory-proven facts are the strongest foundation for your advertising campaign."

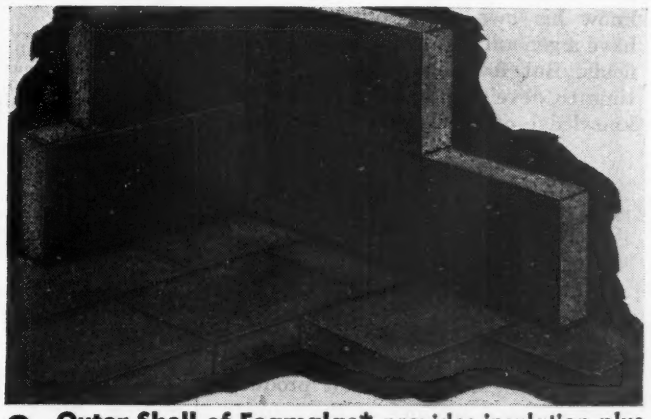
FOOD RESEARCH LABORATORIES, INC.
48-14 Thirty-Third Street, LONG ISLAND CITY—1, New York
RESEARCH, ANALYSES, and CONSULTATION for the FOOD, DRUG, and ALLIED INDUSTRIES

New Cold Room Construction Keeps Out Heat and Moisture

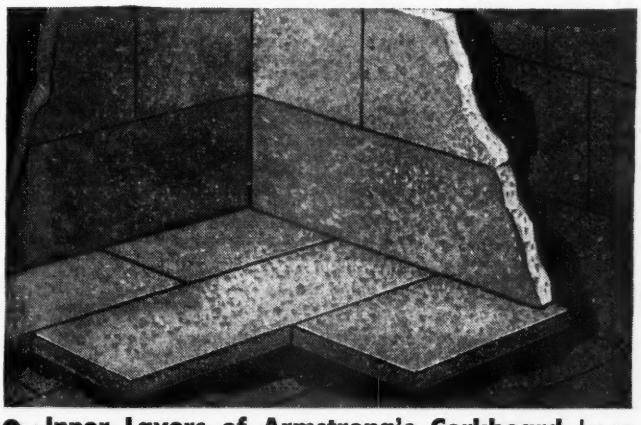
Armstrong's New Low-Temperature Insulation Method Provides Permanent Efficiency



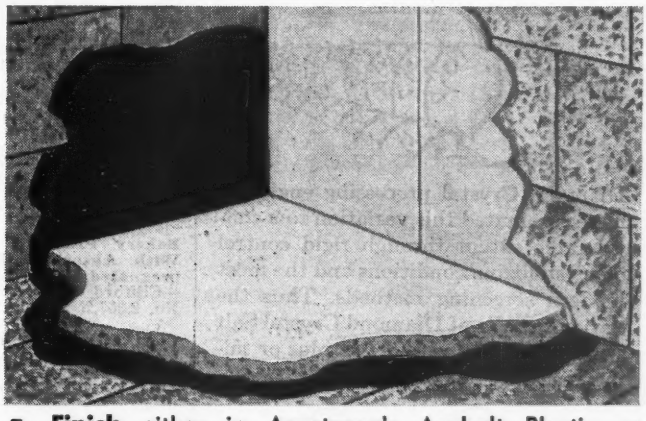
1. Priming Coat of Armstrong's Asphaltic Paint seals the walls of the cold room before insulation is erected.



2. Outer Shell of Foamglas* provides insulation plus a positive, permanent, moisture and vapor barrier.



3. Inner Layers of Armstrong's Corkboard keep heat out of room with maximum insulating efficiency.



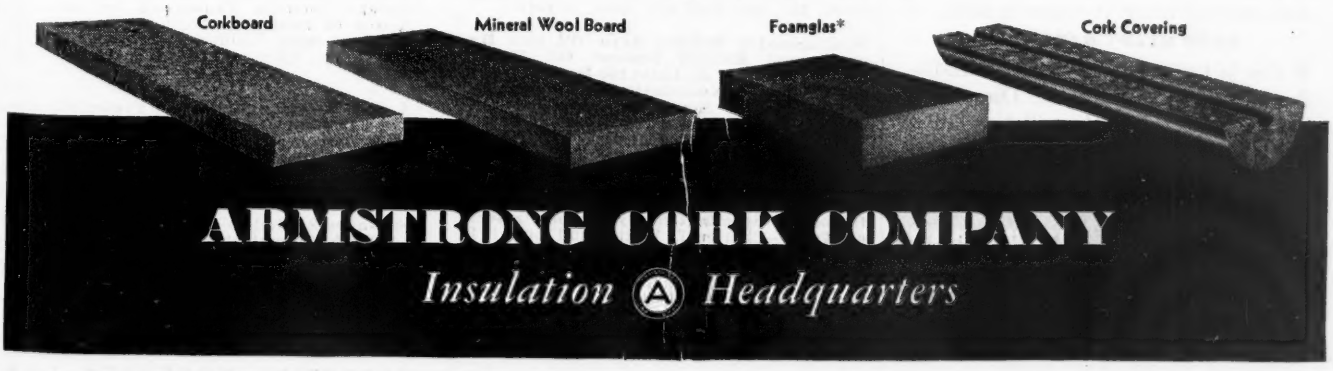
4. Finish either in Armstrong's Asphalt Plastic or portland cement plaster, according to specifications.

ARMSTRONG'S new low-temperature insulation construction combines corkboard and Foamglas to take full advantage of the best properties of both materials.

Armstrong's Corkboard, a cellular insulation, has exceptionally low thermal conductivity and provides high operating efficiency. Foamglas is glass in cellular form. It's an insulation that's absolutely moistureproof, vaporproof, and fireproof—making a lasting seal. Together, these materials assure permanently high insulating efficiency.

FOR COMPLETE INFORMATION about this construction—including engineering drawings and erection specifications—write to Armstrong Cork Co., Building Materials Div., 4211 Concord St., Lancaster, Pa.

* Reg. U. S. Pat. Off. Product Mfg. by Pittsburgh Corning Corp.



ARMSTRONG CORK COMPANY

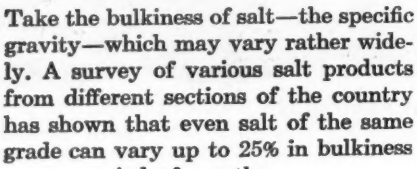
Insulation Ⓐ Headquarters

"Whad'ya Know, Brother, About BULK?"

EVERY TECHNICAL man is supposed to know his own field thoroughly and have a general idea of related technical fields. But few food processors have time to develop more than a sketchy knowledge of these related subjects.

Take the bulkiness of salt—the specific gravity—which may vary rather widely. A survey of various salt products from different sections of the country has shown that even salt of the same grade can vary up to 25% in bulkiness over a period of months.

Diamond Crystal processing engineers have eliminated this variation to a considerable extent through rigid control of crystallizing conditions and the most modern screening methods. Thus the various grades of Diamond Crystal Salt will not vary more than 4% plus or minus—usually not over 2%.



If you, as a food processor, are applying salt by volume—through a hopper, for example, as in salting soda crackers, potato chips, and similar products—you can only achieve flavor control by using a salt that varies but slightly in bulkiness. Why not check the density of each shipment of salt you are using and see how much it varies in bulk?

NEED HELP? HERE IT IS!

If this is the solution to that variable-flavor problem, write our Director of Technical Service. He will be glad to help you find a cure. Diamond Crystal, Dept. J-4, St. Clair, Michigan.

DIAMOND CRYSTAL
ALBERGER PROCESS **SALT**

PATENTS

Carrier for Spice Oils Prepared by Heating Grain of Flour-like Fineness Under Steam Pressure in Closed Chamber To Caramelize Natural Sugar Content—Robert O. Brown and Chastain G. Harrel, to Pillsbury Flour Mills Co., Minneapolis, Minn. No. 2,356,501. Aug. 22, 1944.

Fats, Oils and Like Split and Separated on Continuous-operation Basis—Georg Pieter Gerhard Stalmann, Hamburg-Harburg, Germany, to Alien Property Custodian. No. 2,356,628. Aug. 22, 1944.

Volume of Bakery Products Increased by Addition of Small Quantity of Metal Salt of Pectin to Flour Mixture—Ernst Waldschmidt and Anton Bayer, Prague, Moravia and Bohemia, to Alien Property Custodian. No. 2,356,635. Aug. 22, 1944.

Alkaline Water Solution of Casein and Vegetable Globulins Treated With Acid-forming Gas and Heated to Short of Boiling Point With Liberation and Elimination of Ammonia Not Combined With Protein—Arthur Ebert Poarch, Chicago, Ill., to Glidden Co., Cleveland, Ohio. No. 2,356,795. Aug. 29, 1944.

Sandwich Type of Cookies Made on Low-production-rate Basis by Mechanical Means—Gregory Harding Keller, Helena, Ark., one-half to Robert E. McCormack, Albany, Ga. No. 2,356,853. Aug. 29, 1944.

Fruits Distorted During Pitting Restored to Original Shape and Appearance by Mechanical Means—Burton C. Coons, San Jose, Calif., to Food Machinery Corp., San Jose, Calif. No. 2,356,977. Aug. 29, 1944.

Flour Fortified in Iron Content by Addition of Small Quantity of Complex-bound Iron-alkali Metal Salt of Molecularly Dehydrated Phosphoric Acid—Rufus A. Barackman, Chicago Heights, Ill., to Victor Chemical Works. No. 2,357,069. Aug. 29, 1944.

Dough Sheeted and Elongated by Mechanical Means Into Relatively Narrow Flat Strip of Uniform Width and Thickness Preparatory to Baking—Morris Cohen, Kansas City, Mo., and Duard W. Enoch, George Hasty and Gerald A. Jorgenson, Chicago, Ill., to Interstate Bakeries Corp., Kansas City, Mo. No. 2,357,085. Aug. 29, 1944.

Bakery Products Packaged in Container With Absorbent-sheet Inner Lining Impregnated With Volatile Flavoring Material—Clifford G. Harris, Binghamton, N. Y. No. 2,357,258. Aug. 29, 1944.

Corn Sirup and Similar Liquids Metered Under Gas Instead of Pump Pressure—Paul H. Stambaugh, to Union Starch & Refining Co., Columbus, Ind. No. 2,357,270. Aug. 29, 1944.

Wheat Germ Mixed With Substantially Equal Amount of Crystal Sugar to Aid Fine Grinding of Germ for Inclusion in Bread Dough—Josef Cryns, Kansas City, Mo., to Jay Burns, Evanston, Ill. No. 2,357,312. Sept. 5, 1944.

Glyceride Oils Simultaneously Decolorized, Stabilized and Hardened—William J. Paterson, Newton Highlands, Mass., to Lever Bros. Co., Cambridge, Mass. No. 2,357,352. Sept. 5, 1944.

Cream Sterilized During Centrifugal Separation From Milk—Peter W. Damon, Barton, Vt. No. 2,357,384. Sept. 5, 1944.

Metal Food and Beverage Container Made to Have Continuous Protective Coating of Silver—Charles E. McManus, Jr., Spring Lake, N. J., and Giles B. Cooke, Baltimore, Md., to Crown Cork & Seal Co., Inc., Baltimore, Md. No. 2,357,415. Sept. 5, 1944.

Hydrogenated Refined Soya Oil and Hydrogenated Refined Sesame Oil Having Melting Point of At Least 100 Deg. F. Added to Relatively Nonvolatile Fatty Material Preparatory to Steam Deodorization—Guy W. Phelps and Howard C. Black, to Industrial Patents Corp., Chicago, Ill. No. 2,357,543. Sept. 5, 1944.

Fatty Constituent of Animal Tissue Separated From Nonfatty Constituent by Difference of Specific Gravity in the Presence of Water—Charles T. Walter and Lowell R. Newton, Chicago, Ill., to Industrial Patents Corp. No. 2,357,566. Sept. 5, 1944.

Dehydration Obtained in Unit Designed to Permit Introduction of Stream of Cool Air Tangentially Into Chamber To Cool Product Before Collecting in Lower Portion of Chamber—Joseph M. Hall, Chicago, Ill., to Drying & Concentrating Co. No. 2,357,648. Sept. 5, 1944.

Loaves of Dough Carried on Conveyor Under Roller for Application of Thin Film of Oil Before Placing in Baking Pan—Robert G. Moench, Jr., Columbus, Ohio, to Moench Corp., New York, N. Y. No. 2,357,679. Sept. 5, 1944.

Vitamin B Complex Concentrate Extracted From Finely Divided Cereals and Legumes—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,357,756. Sept. 5, 1944.

Food Dehydrated During Storage in Closed Container Containing Moisture-absorbing Material and Lined With Hydroscopic Grease-proofing Film—Albert A. Robbins, Pomona, Calif. No. 2,357,767. Sept. 5, 1944.

Chewing Gum Base Made To Consist of White Mineral Oil and High-melting Terpene Resin—Frank W. Corkery, Crafton, and Samuel G. Burroughs, Pittsburgh, Pa., to Pennsylvania Industrial Chemical Corp. No. 2,357,811. Sept. 12, 1944.

Corn Popped at Continuous Rate in Machine Equipped With Pans Traveling on Conveyor Over Fixed Heating Elements—William E. Hamilton, Evanston, Ill., to F. L. Klein Noodle Co., Chicago, Ill. No. 2,357,820. Sept. 12, 1944.

Dextrose Crystallized From Invert Sugar Solution by Addition of Lower Aliphatic Alcohol and Vigorous Mechanical Agitation—James Cyril Mahoney, Manila, P. I. No. 2,357,838. Sept. 12, 1944.

Eggs Mechanically Cleaned by Action of Cylindrical Rotary Brushes—John A. Grant, Tampa, Fla. No. 2,357,892. Sept. 12, 1944.

Canned Navel Orange Juice Prepared to Avoid Development of Natural Characteristic Bitter Flavor—Ralph H. Higby, Ontario, Calif., to California Fruit Growers Exchange, Los Angeles, Calif. No. 2,357,895. Sept. 12, 1944.

Dried Apples Ground Coarsely and Coated With Mixture Consisting of 20 Parts Milk Powder, 80 Parts Dextrose and 1 Part Bleaching Agent Preparatory to Removal of From 10 to 23 Percent by Weight of Moisture Content—Edward R. Mollner, Van Nuys, Joseph A. Weber, La Canada, and James T. Brennan, Van Nuys, Calif. No. 2,358,086. Sept. 12, 1944.

Canadian Patents

Juice Expressed From Fruit in Continuous Manner by Action of Spiral Screw Operating in Housing Having Plurality of Small Apertures—Lars Johan Faith Ell and Karl Gunnar Zetterstrom, to Aktiebolaget Elektrolux, Stockholm, Sweden. No. 422,879. Sept. 26, 1944.

Pits Removed From Cling Drupaceous Fruits by Mechanical Means—Raymond L. Ewald, Olympia, Wash., to Special Equipment Co., Portland, Ore. No. 422,929. Sept. 26, 1944.

Soya Spread Made to Consist of Carrier and Finely Milled Particles of Soybeans Previously Soaked and Boiled in Edible Oil—Charles Potter, to J. L. Trumbull, Ltd., Vancouver, British Columbia, Canada. No. 422,936. Sept. 26, 1944.

Animal Tissue Such as Meat and Stuffed Natural Casings Tenderized by Enzymic Action of Bromelin—John M. Ramsbottom and Levi Scott Paddock, to Industrial Patents Corp., Chicago, Ill. No. 423,019. Oct. 3, 1944.

Animal Tissue Subjected to Proteolytic Enzyme Content of Papaya Juice and Temperature Below Inactivating Temperature for Enzyme—John M. Ramsbottom and Levi S. Paddock, to Industrial Patents Corp., Chicago, Ill. No. 423,020. Oct. 3, 1944.

Sausages Stuffed in Natural Casings Treated With Animal Proteinase, Cathepsin, in Acid Medium at Temperature Between 60 and 125 Deg. F.—John M. Ramsbottom and Levi S. Paddock, to Industrial Patents Corp., Chicago, Ill. No. 423,021. Oct. 3, 1944.

LETTERS TO THE EDITOR

Cider vs. Apple Juice

To the Editor of Food Industries:

Have read with much interest Robert Dillman's "Letter to the Editor" in which he states that "cider" differs from "apple juice" in that "cider" is allowed to oxidize by enzymic oxidation whereas "apple juice" is pasteurized before such enzymic oxidation occurs.

I would remind him and other readers of Food Industries that "cider" is the fermented juice of the apple and nothing else but! In France, it is "cidre" and carries enough alcoholic "wallop" to knock the most hardened New England cider connoisseur for a loop. In England, cider, fermented apple juice, is a very popular alcoholic beverage of considerable potency. In some text books, cider is the fermented juice of the apple and must be made in certain manner.

Cannot Mr. Dillman and other boosters for nonalcoholic "cider" invent another name for their brown apple juice and let us who like our cider alcoholic reserve that name for the ethylated product of the apple?—W. V. Cruess, *Division of Food Technology, University of California, Berkeley, Calif.*

Processed Cereal Not Inferior to Home Cooked

To the Editor of Food Industries:

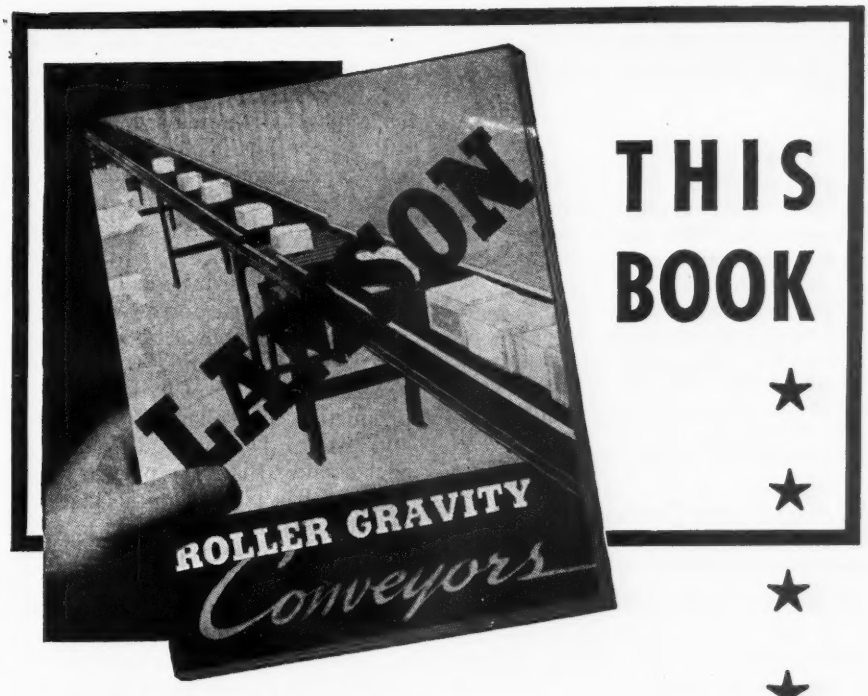
In the third column of page 142 of the August, 1944, issue of Food Industries is an article entitled "Cereal Proteins." Most of paragraphs two and three deal with a review of the article by Stewart, Hensley and Peters, *Journal of Nutrition*, vol. 26, 519-26, 1943, although your review was evidently based on the summary given in *Nutrition Reviews*, page 167, June, 1944.

The third paragraph of your review contains a definitely misleading statement. I refer to the sentence: "Oven-expanded oat cereal, drum-dried oatmeal and rolled oats were about equal to each other, *and much inferior to 'home cooked' oatmeal in biologic value.*" The *underlined* portion is not true, although I can see where that impression might have arisen on reading the review in *Nutrition Reviews*.

I am enclosing a reprint of the original article, and in Table I you will see these relative protein qualities:

Uncooked rolled oats	100
Home-cooked oatmeal	104
Oven-expanded cereal	105
Drum-dried oatmeal	102
Gun-exploded oats-corn-rye cereal	39

In other words, there was no significant difference between raw rolled oats, home-cooked rolled oats, drum-dried oatmeal and oven-expanded oat cereal. The point to be made is that home cooking does not in any way impair the protein quality of rolled oats; neither is the protein quality of certain other precooked oat products im-



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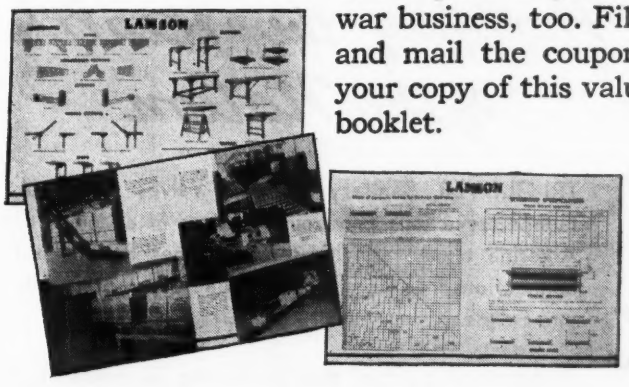

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paired. However, with gun-exploded products the protein quality is drastically impaired.

Another very minor change could be noted. The last sentence of the second paragraph reads: "This is attributed to destruction of certain of the essential amino acids." It would have been more accurate to have stated: "This may be attributed to the possible destruction of certain of the essential amino acids."

At the time the articles in question were written, no one had any knowledge as to whether the amino acids were destroyed.

I would appreciate it if you find it possible to correct these incorrect statements. —F. N. PETERS, *Director of Research, Quaker Oats Co., Chicago, Ill.*

World Food Outlook

(*Continued from page 69*)

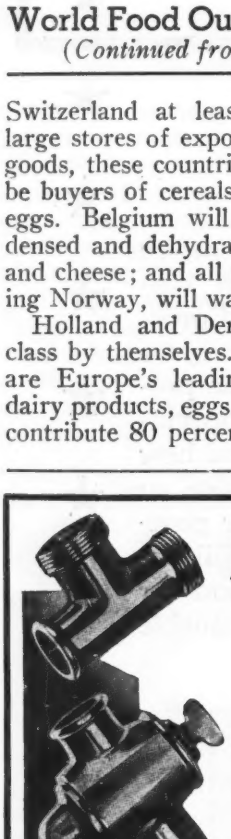
Switzerland at least probably has large stores of exportable industrial goods, these countries will probably be buyers of cereals, fats, meat and eggs. Belgium will also want condensed and dehydrated milk, butter and cheese; and all of them, including Norway, will want fruits.

Holland and Denmark are in a class by themselves. Both normally are Europe's leading exporters of dairy products, eggs and meat. They contribute 80 percent of the Continent's net dairy exports, over 60 percent of the net exports in eggs and egg products and 55 percent of the net exports of animals, meat, bacon and lard. The Netherlands cattle herd is 10 percent, the Danish herd 5 percent, below prewar numbers, and the output in milk as well as the yield in beef and veal is proportionally below the reduction in the size of herds. Danish hog production is at present probably 20 to 25 percent, and that of Holland 60, or more, percent below prewar levels. Egg production in Holland is 75 percent and that of Denmark about 50 percent smaller than for prewar years. Holland has plowed up a large part of her pastures in order to grow more grain, vegetables and oilseeds. Her highly organized truck crop industry as well as the best pastures (which are below sea level and rely to a great extent on pump drainage) may suffer seriously from flooding.

Denmark has suffered little thus far from actual warfare. Her agriculture has made remarkable adjustments since 1942 and has succeeded in expanding crop and fodder production sufficiently to expand her livestock herd. Normally, Denmark imported 30 percent, Holland 63 percent of this grain and oilcake. Both countries will swing back to their former policy of buying bread and feed grain and oilseeds, in order to be able to export pork, bacon, lard, eggs, butter and cheese. Due to the large domestic oilseed production, which only gradually will recede, less than 183,000 tons of vegetable oils in the form of seed, and somewhat less than 1.1 million tons of grain and dry legumes may be purchased by the two countries. The egg and hog production will recover rapidly, and even dairy production is likely to respond very quickly to overseas imports of oilseeds and grain.

Finland and Sweden normally export dairy products, and Sweden also exports pork and bacon. Both countries import normally between 10 and 20 percent of their grain and oilseeds. It will take the Swedes probably two years to have dairy supplies for export again. The Swedes may supply the Finns with some pork and bacon. Additional requirements will be needed from overseas for a period of from two to three years. In Finland much will also depend on her new boundaries and the general reconstruction of the country. The total supplies needed will remain small in volume.

Austria and Czechoslovakia both



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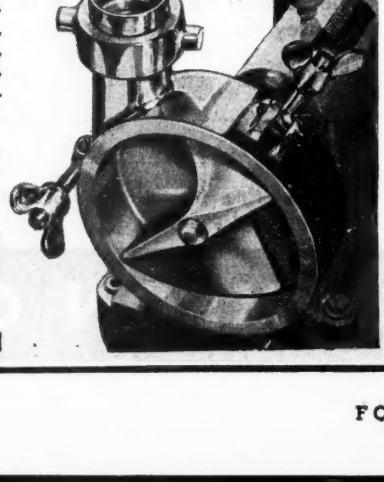

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have solid agricultural foundations. Each needs relatively small amounts of grain. Austria has imported some meat. Czechoslovakia imports normally some 30,000 to 40,000 tons of meat, bacon and lard, but some 200,000 to 300,000 tons of exportable sugar. All the deficit countries mentioned so far — excluding the United Kingdom — may need some 150,000 to 250,000 tons of meat and 200,000 to 300,000 tons of fats or oils.

Germany's Needs

There remains, of course, Germany — the Continent's chief importer of fats and oils, meat, dairy products, eggs, grain, fruits and vegetables. With full industrial production, all her efforts at food autarchy had failed to prevent the widening of the import deficit. But her agriculture is still in remarkably good shape. Whether it will still be in this condition when Allied occupation begins remains to be seen. If it is, only a modest requirement of food imports may exist, consisting mainly of several million tons of grain, 300,000 to 400,000 tons of vegetable or whale oil, a similar amount of oilcake, 50,000 to 70,000 tons of butter and several hundred thousand tons of meat.

Such "requirements" would mean the volume of imports needed to bring the diet of the people back to a more normal state. It is obvious that if real shortages should exist in the world market, supplies would not be granted and that Great Britain and the liberated nations would have priority. If there should be an abundance of supplies or even a bothersome surplus situation, the victorious Allies might be more inclined to make food imports more freely available, particularly if they should want to utilize German war industries in the final phase of the war against Japan, and if desperate shortages tend to demoralize people under military government.

Facts About Packaging

(*Continued from page* 91)

content of fresh rutabagas is about 89 to 91 percent. Such comparatively high values resulted probably because this product was cut into cubes smaller than usual, giving a greater surface area. The weight of water absorbed on this surface during the drained-weight determination was therefore probably greater than usual.

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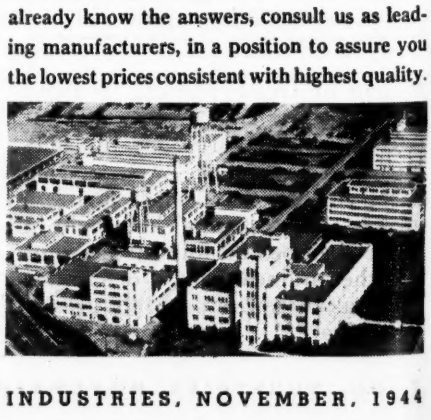

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FOOD TECHNOLOGY

NEW DISCOVERIES AND INVENTIONS

CEREAL PRODUCTS

Starch from Wheat

STARCH suited for commercial use as such or for conversion into high quality sirups can be produced from wheat flour or from rye, barley or oat flours. Corn, sorghum and rice flours are not as satisfactory. Flour from low-grade or damaged wheat can be used.

For protein removal the flour is treated with NaOH at a pH of 10.6 or higher (but not over 11.8) and temperature not over 95 deg. F. Starch can be obtained from the alkaline solution by tabling or by centrifuging. Tabling yields a major portion of very high quality which can be filtered and dried or converted into sirup. Neutralization of the milk, screening and retabling in alkaline suspension is recommended. The tailings contain starch that can be recovered for production of lower grade sirups or wet starch of fair quality. The starch produced by centrifuging is not of the highest quality, but the yield is good.

Proteins can be recovered by acidifying the filtrate from the centrifuge or the table liquor. It has undergone some changes in the alkali treatment, but can be used for glutamate production.

Digest from "Production of Starch from Wheat and Other Cereal Flours," by R. J. Dimler, H. A. Davis, C. E. Rist and G. E. Hilbert, Cereal Chemistry, vol. 21, 430-46, September, 1944.

MEATS

Dehydrated Scrapple

INCLUSION of cornmeal or other cereal with pork for dehydration absorbs excess fat and has an antioxidative effect. Taste tests indicate that the scrapple is much more acceptable than the pork dehydrated without cereal. And the scrapple has the further advantage that the dried slices can be eaten like crackers when rehydration is not possible. It is crisp and not greasy.

A polenta grind of cornmeal was found to give a good texture in the reconstituted product. Barley, cracked wheat and rye improve the flavor when substituted for part of the cornmeal.

A formula is suggested containing 58 percent of ground lean pork with 20 percent fat or less, 33 percent of cornmeal and 0.8 percent of salt, with the balance water. A small quantity of black pepper was found acceptable as a seasoning, but other seasonings commonly used in fresh scrapple were unsatisfactory.

The meat is heated without water for 20 minutes, over a water bath, then water is poured over it, the mixture brought quickly to boiling, cornmeal and salt added, and the mush steamed 30 minutes. Cooled scrapple is cut in slices $\frac{1}{16}$ in. thick and dehydrated at 155 deg. F. for 5 to 6 hours. It can be compressed by heating to 122 deg. F. or higher and holding one minute under 1,000 p.s.i.

The product did not become rancid in 2 months at 90 deg. F. in air or after 9 months at room temperature.

Digest from "Dehydration of Meat Scrapples," by B. C. Carl, B. M. Watts and A. F. Morgan, Food Research, vol. 9, 319-27, July-August, 1944.

ENGINEERING

Lard Filtration

COMBINATIONS of filter aids and activated decolorizing carbon are of value in refining steam rendered lards. Diatomaceous filter aids accelerate filtration to remove turbidity, ferments, gummy and glue-like substances. Decolorizing carbons give a mild bleach. Both act without undesirable effects on the flavor.

Filtration tests were made in a special bomb filter which provided accurate control of temperature and pressure as well as of other filtration factors.

Efficacy of filtration was judged by the clarity of the filtered liquid in a photometric tyndallmeter. The apparatus could be operated to give values for clarities independent of color.

The study shows the general advantages of diatomaceous filter aids in increasing filtration rate, improving clarification and preventing carbon smearing of the filter cloth.

Digest from "Filter Aid and Carbon Treatment of Prime Steam Lard," by A. B. Cummins, L. E. Weymouth and L. L. Johnson, Oil and Soap, vol. 21, 215-23, August, 1944. The apparatus for filtration tests was described in Industrial and Engineering Chemistry, vol. 34, 392, 1942.

BACTERIOLOGY

Pressure Reduces Bacterial Count

DAIRY TECHNOLOGISTS at the University of Illinois have evidence pointing to the tentative conclusion that use of two or more factors harmful to bacteria causes greater destruction of the microorganisms than the same factors applied singly. The principle, if verified, may be useful in other fields of food preservation.

In this case experiments were conducted with fluid milk held under pressures of CO_2, nitrous oxide and freon. A pressure of 55 p.s.i. of nitrous oxide kept the plate count of a sample held at 50 deg. F. for 4 days to 61,000, while the control, at the same temperature but not under pressure, had 31,000,000.

When pasteurization and pressure were both used, the effect was more marked. Inoculated milk after pasteurization showed no *E. coli* when held under 100 p.s.i. of nitrous oxide, and a count of 44,000 for that organism in samples pasteurized but not under pressure.

Pressure followed by pasteurization also gave favorable results. CO_2 seemed more effective than nitrous oxide, while freon gave about the same results as the nitrous oxide.

Digest from "Behavior of Micro-Organisms in Fluid Dairy Products When Held in Atmosphere of Different Gases under Pressures," by M. J. Prucha, paper presented before the 39th Annual Meeting, American Dairy Science Association, June, 1944, abstracted in Journal of Dairy Science, vol. 27, 665-6, August, 1944.

FATS AND OILS

Peach Kernel Oil

A FIXED edible oil, undistinguishable from almond oil except by colorimetric tests, is being produced commercially in Australia from peach and apricot kernels. It is officially designated "persic" oil. It can be used interchangeably with palm, almond and olive oils.

Sun-dried stones are preferred. The fresh stones from the canneries and other producing areas are scrubbed, then allowed to dry for 10 weeks or more. They are then cracked and the shells separated from the kernels by flotation. The crude oil is expressed and refined.

Details of refining methods used are not given.

Digest from "Persic Oil," Australian Food Manufacture, vol. 13, 18, June, 1944.

Deodorized Oil

UNPLEASANT odors and flavors characteristic of soya, linseed and sunflower oils are removed by steam distillation of these oils under vacuum at relatively high temperatures. A patent has been issued on the process.

The odors are due to the presence of unsaponifiable compounds, probably high molecular weight fatty sterols. A considerable portion of the total unsaponifiable matter will be removed by distillation for 2 to 5 hours at temperatures of 250 to 275 deg. C. and under a pressure of less than 20 mm. of mercury, and preferably 5 to 10 mm. After this time, the temperature may be reduced to the usual deodorizing range of 210 to 230

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deg. C., still using vacuum and steam. After the treatment, the oil should be cooled under vacuum to below about 95 deg. C.

A relatively heavy flow of dry steam is required. This should not be less than 1 part of total steam measured as volume of condensed water to 3 parts of oil, and may go as high as 1 part to 1.

Oils deodorized in this way may be used in the manufacture of margarine, shortening and salad oil.

Digest from U. S. Patent 2,351,832, issued June 20, 1944, to R. H. Neal and assigned to The Best Foods, Inc., New York.

Use of Tannins

TANNINS, even in very small amounts, greatly improve the keeping qualities of the oxidizable fats. According to a recent patent the reagent may be tannic acid or any of the tannins derived from the bark of the quebracho, oak, sumac, hemlock and like trees.

The fatty materials may be treated for a short time with the tannin and then filtered. In spite of the removal of a tannin compound by this filtration the filtered fatty materials retain stability against rancidity and are free from the taste or flavor of the tannins. The antioxidant may also be added to an oil or melted fat which is then deodorized in the usual way, but with improved oxidation resistance. Even the addition of tannin to fat which is subsequently steam rendered is claimed to be effective.

Digest from U. S. Patent 2,354,719, issued August 1, 1944, to B. J. Verbeek and assigned to Wilson & Co., Inc.

QUALITY CONTROL

Histamine in Fish

SEVERAL TESTS for the freshness of fish have recently been reported. One that depends on a substance which is not destroyed in processing is the determination of histamine.

Histamine in fresh fish frozen immediately after catching is very low, values from 0.09 to 1 mg. per 100 grams being found. In fish on arrival at the cannery "fresh", that is, 4 to 6 hours out of the water, histamine will be less than 6 mg. per 100 grams. Development of the chemical, probably through bacterial action, is rapid. For example, in sardines held at room temperature, 68 to 77 deg. F., values in mg. per 100 grams were 4.5 when fresh, 30 after 12 hours and 62 after 24 hours. In this case the values after canning were somewhat lower, probably due to the loss of some histamine to the liquid, which was not included in the sample. Agreement was close enough for practical use.

The test enabled the author to distinguish between good commercial products and experimental or rejected packs made with stale or tainted fish, even when processing had destroyed characteristic odors.

Histamine is determined by the method of Minard and of Guggenheim, by measuring the contraction of fresh guinea pig gut held in Ringer-Locke solution.

Digest from "Histamine Content of Unprocessed and Canned Fish, A Tentative Method for Quantitative Determination of Spoilage," by E. Geiger, Food Research, vol. 9, 293-97, July-August, 1944.

Citric Acid in Dry Milk

It has been proposed to use citric acid as an indicator of the amount of milk solids used in bread and similar products. Tests now reported seem to bear out the idea that the citric acid content of defatted milk solids is sufficiently uniform throughout the country and throughout the year to make this possible.

A small seasonal variation was found in 27 samples taken at one plant during the year, but the range was only from 1.88 to 2.09 percent, with an average of 1.995. Samples from 11 different states representing a wide geographical distribution varied from 1.83 to 2.08, with an average of 1.961 percent.

Digest from "Seasonal and Geographical Variations in the Citric Acid Content of Defatted Milk Solids," by B. Heinemann, Journal of Dairy Science, vol. 27, 773-77, September, 1944.

DEHYDRATION

Carrots for Dehydration

Muck soil produces carrots which are less desirable for dehydration than does upland or mineral soil. The latter gives a product which is superior in color and general appearance when dehydrated and less susceptible to oxidative rancidity in storage. For 10 lb. of dried product, 85 lb. of upland carrots or 100 lb. of those grown on muck soil was required.

It is urged that manufacturers of dehydrated foods develop recipes for their use in home-style dishes, and this paper includes examples.

Digest from "Factors Influencing Quality of Dehydrated Carrots," by B. Newcombe and D. C. Alderman, Michigan Agricultural Experiment Station Quarterly Bulletin, vol. 26, No. 4, May, 1944.

Spray-Dried Whole Milk

Occluded oxygen in spray-dried milk powder is not removed by the ordinary processes of gas packing. The amount of this oxygen can be determined by measuring the oxygen concentration of the headspace gas immediately after packing the powder and again when sufficient time has elapsed for diffusion of the oxygen to reach equilibrium. Since the oxygen content has such an important bearing on keeping of whole milk powder, any improvements in processing which reduce the amount of contained oxygen are of interest.

Oxygen content can be decreased by using condensed milk of high total solids, avoidance of agitation of the condensed milk prior to spraying and also by an addition of sodium ascorbate be-

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fore spraying. The orifice in the spraying head should be fairly large, with lower pressure.

The powder should be handled so that it has no opportunity to pick up oxygen after drying. Powder packed from the drier at a temperature of approximately 120 to 125 deg. F. held less oxygen than that cooled to 60 deg. F. or that aged 18 to 24 hours before packing.

In packing, the multiple gas technic is the most effective method for reducing oxygen content to a minimum. The factors in packing technic showed more variation than those in processing. Evacuation to an absolute pressure less than 12 mm. is necessary with properly prepared milk to meet the Quartermaster Corps specification of 3 percent by volume maximum oxygen.

Digest from "Factors Affecting the Oxygen Content of the Gaseous Phase of Packaged Whole Milk Powder," by J. H. Hetrick and P. H. Tracy, paper presented before the 39th Annual Meeting, American Dairy Science Association, June, 1944, abstracted in Journal of Dairy Science, vol. 27, 685-6, August, 1944.

Dried Herrings

COMMERCIAL herring drying is being undertaken in Scotland, following methods worked out by the Department of Scientific and Industrial Research.

Herrings are packed in ice as soon as landed, to permit shipment to the factory and any necessary holding. Iced herring are put through a rotary horizontal washer to remove slime, scales and dirt. Washed fish are split, gutted, block filleted and again washed, on a mechanical cleaning line. Roes and milts are canned. The fillets retain the skin. Fillets are cooked on perforated trays in horizontal canning retorts, 20 minutes at 6 lb. steam pressure.

Cooked fish are cooled in about ½ hour to below 100 deg. F., using a small tunnel cooler with air draft. Some of the moisture is also removed in this preliminary step.

Cooled fish is ground to ¼ to ⅜ in. particle size, and loaded on drying trays to a density of 2¼ lb. per square foot.

The tunnel dryer is steam heated and has provision to insure uniform air flow over the entire cross section by means of adjustable diffuser walls in each end. Drying takes about 4½ hours. Inlet temperature is held at 175 deg. F. for 1½ hour, then reduced to 160 deg. F. Wet-bulb temperature rises quickly to about 125 deg. F. at the beginning of the drying cycle, then falls gradually.

The product is nitrogen packed in No. 10 tins. Gas in the can immediately after packing should contain less than 0.5 percent of oxygen. This is necessary because the herring fat is particularly prone to rancidity, unless so treated.

Chemical and bacteriological analyses are made daily on raw materials and the dried product. Also, daily taste tests are made by a panel.

Digest from "Dehydration of Herrings," Food, vol. 13, 240-45, September, 1944.

QUESTIONS and ANSWERS

Soya Milk

Mexico—"I am specially interested in the manufacture of soybean milk. Will you please advise me?"

Technical literature on the processing of soybeans is as yet rather scarce. As far as we know there is no generally recognized or precise method of making soya milk.

If soya flour is soaked for a few hours, then finely crushed and boiled for about 30 minutes in the proportion of 3 parts of water to 1 part of mash, a milky emulsion is obtained which is very similar in appearance and properties to animal milk. This liquid, separated out by means of a very fine sieve or cloth strainer, is the soybean or vegetable milk used so extensively in China. Soya meal, after the oil is extracted, or whole soybean meal, may be utilized quite as well.

We have rough working directions for one procedure that is followed on a limited commercial scale, and a suggested formula for an infants' soya milk. The details of any procedure must vary according to the grade and variety of beans and the type of equipment available.

One method is to use the following:

Cleaned whole soybeans	100 lb.
Sugar (calculated as dextrose)	55 lb.
Oil	30 lb.
Salt	6 lb.
Water to make:	
Before filtering a volume of	70 gal.
At finish a volume of	80 gal.

Start by soaking beans in water at room temperature for about 12 hours, keeping well covered. Then grind finely in a manner similar to wet-grinding of corn or any other grain. A stream of water should be fed into the mill along with the beans to avoid clogging and to form a slurry.

Add enough more water to give a volume of 70 gal. preparatory to heating in a glass-lined, stainless steel or other sanitary, corrosion-resistant metal vat. Bring to temperature of 130 deg. F. with continuous agitation, and filter to remove granular or coarse portions of beans. Boil in the same type of vat or cooker for 45 minutes, with constant agitation.

To a conveniently handled portion of this hot milk add the oil (soya, corn or cottonseed) and whip into an emulsion.

Add this emulsion, with the sugar and salt, to the hot milk and continue boiling and stirring for 15 minutes. Add water to bring volume up to 80 gal. Cool quickly and bottle.

The tentative formula for an infants' milk lists ingredients but gives no working directions. The ingredients are:

Sugar	40 g.
Soya flour	125 g.
Lactose	30 g.
Peanut oil	20 g.
Dextrine	20 g.
Egg yolk, liquid	50 g.
Calcium lactate	6 g.
Salt	2 g.

About a year or so ago the soybean industry established the Soya Food Research Council, composed of technical men active in the industry. Its object is to prepare and disseminate dependable and usable technical information concerning the processing of the soybean products. The address of this council is 3818, Board of Trade Building, Chicago.

Preserve Plants

New York—"We are moving to a new location and we should very much like to receive suggestions by way of a model layout of preserve and jelly plants."

A layout, meaning a plan for the arrangement of equipment on the floor, can only be prepared by an engineer familiar with the building, machinery and production of the proposed plant. We can suggest a flow sheet, showing the sequence of operations and typical equipment, which can be adapted to any desired rate of production by selection of the suitable size and number of units.

A typical small preserve plant operation, using a batch process, would be arranged to provide for the following operations:

1. Drain frozen fruit on a colander. Set fruit aside in tubs.
2. Put juice and sugar in a steam-jacketed jam kettle.
3. Boil. Strain juice through two layers of cheesecloth.
4. Return the juice to the kettle and add drained fruit.
5. Add pectin or strained apple concentrate.
6. Add citric or tartaric acid if needed.
7. Boil to desired consistency.
8. Fill, cap and sterilize.
9. Wash and cool.
10. Label, case and ship.

This is for a high-quality product. Straining of the sugared juice may be omitted for less exacting requirements. Sterilizing after capping, in step 8, can be omitted if the product is filled at a temperature over 190 deg. F. and capped before the temperature falls.

Jelly making from prepared juice would not require step 1. Otherwise the process is the same. Straining in step 3 is obligatory.

When pectin solution is prepared, equipment must be arranged for the following:

1. Chop apples.
2. Place in a steam-jacketed kettle, add water and boil.
3. Press, using a hydraulic cider press. Discard or sell press cake.
4. Heat or concentrate the juice in a steam-jacketed kettle or evaporator.
5. Strain through two layers of cheesecloth. Pack boiling hot. Two- or 5-gal. jars are convenient.
6. Store for use in step 5 of the jam or jelly line.

FORMULAS FOR FOODS

FORMULA NO. 498

Cranberry Sherbet

Granulated cane sugar	12 lb.
Corn sirup solids or dextrose	6 lb.
Water	14 qt.
Cranberry puree	10 lb.
Lemon juice	1½ qt.
Ice cream mix	2 qt.
Locust bean gum	2 oz.
Gelatine	1 oz.
Cherry color	as desired

Directions

To prepare the cranberry puree blanch 10 lb. of cranberries by pouring about 1 gal. of hot water over them; allow to stand for two minutes then drain. Place the blanched cranberries in a double boiler, add 4 lb. of sugar and 6 qt. of water. Cook until the skins crack. Strain through a colander and cool.

Blend the cane sugar, corn sirup solids or dextrose, locust bean gum and gelatine by mixing them dry. Heat the water to 180 deg. F. Sift the dry mixture into the hot water, stirring vigorously until it is completely dissolved. Cool this mix to about 50 deg. F. Add the prepared cranberry puree, lemon juice and color, stirring until well mixed.

Put the combined mixture in the freezer. Start whipping and freezing for two minutes, then add the ice cream mix gradually. Continue freezing until an overrun of about 50 percent is obtained. Remove the finished sherbet to containers and place in the hardening room at about 15 deg. below zero F.

Formula from B. I. Masurovsky.

FORMULA NO. 499

Fudge Bars

Corn sirup	50 lb.
Granulated sugar	40 lb.
Standardized invert sugar	10 lb.
Edible oil	5 lb.
Unsweetened evaporated milk	30 lb.
Basic casting fondant	100 lb.
Salt	1 lb.
Frappe	20 lb.
Full fat soya flour	20 lb.
Flavoring	as desired

Directions

The casting fondant is made with 80 lb. of granulated sugar, 20 lb. of corn sirup and 10 lb. of standardized invert sugar, with water to dissolve the sugar. Heat all together, stirring occasionally, until the batch boils, then wash down all grains that adhere to the inside of the kettle and boil rapidly to 242 to 246 deg. F. Cool to 130 to 115 deg. F. Beat into fondant.

The standard frappe is made with equal weights of corn sirup and standardized invert sugar, with albumen in the proportion of 1½ oz. dissolved in 3 oz. of water for 10 lb. of the sugars. Boil the corn sirup to 245 deg. F. Turn off the heat. Add the invert sugar, stirring until melted. Beat in a marshmallow beater, adding the albumen solution. Beat until light.

To make the fudge, place the corn sirup, sugar, invert sugar, edible oil and evaporated milk in a kettle. Mix well. Continue to stir while cooking to a medium ball (approximately 245 deg. F.). Turn off the heat. Add the fondant and salt, mixing thoroughly, then add the frappe, soya flour and flavor and mix well.

Spread the batch on heavy waxed or oiled paper. When it has set, it may be scored or marked into squares.

Formula from The Nulomoline Co.

FORMULA NO. 500

English Nut Cup Cakes

Granulated sugar	3 lb. 8 oz.
Shortening	1 lb. 2 oz.
Salt	1 oz.
Vanilla flavoring	½ oz.
Liquid milk	2 lb.
Cake flour	2 lb. 12 oz.
Baking powder	1 oz.
Whole eggs	2 lb. 4 oz.
Chopped walnuts	1 lb.

Directions

Cream together 2 lb. 8 oz. of granulated sugar with the shortening, salt and vanilla flavor. Dissolve 1 lb. of sugar in the milk and add to the creamed mixture. Sift together the cake flour and baking powder, add and mix for 5 minutes. Add the eggs and mix again for 5 minutes. Fold in the chopped nuts.

These cup cakes should be baked in paper cups. Bake at 360 deg. F.

Formula from Pillsbury Flour Mills Co.

FORMULA NO. 501

Pure Orange Jelly

Water	85 lb.
100-grade citrus pectin	18 oz.
Concentrated orange juice*	14 lb. 8 oz.
Sugar	100 lb.
Citric acid solution	20 fl. oz.

*72 percent soluble solids

Directions

Put the water into the kettle and turn on the steam. When it has reached a temperature of 160 to 180 deg. F., add the pectin, thoroughly mixed with 8 times its weight of granulated sugar. Allow the mixture to come to a brisk boil, stirring occasionally. Boil vigorously for about one-half minute.

Add the fruit juice and the balance of the sugar. Boil as vigorously as possible to a temperature 7 to 8 deg. F. above the boiling point of water at the factory (equivalent to 219 to 220 deg. F. at or near sea level). Turn off the steam and immediately add the acid solution. Mix thoroughly.

Draw off the hot jelly and fill into containers immediately. Filling and capping should be finished while the jelly is still above 190 deg. F., or the capped jars must be sterilized.

The yield should be approximately 170 lb. of finished jelly at 65 percent soluble solids.

Formula from California Fruit Growers Exchange.

FORMULA NO. 502

Christmas Cheese Pie

Sugar	2 lb. 8 oz.
Emulsifying hydrogenated vegetable shortening*	9 oz.
Corn starch	9 oz.
Eggs	1 lb.
Fresh whey cheese	9 lb.
Whole milk	4 qt.

*May be replaced in part with butter.

Directions

Mix together the sugar, shortening and corn starch. Add the eggs gradually then mix in the whey cheese (Rocotto cheese). Finally add the milk.

Fill unbaked pie shells two-thirds full. Bake at 400 deg. F. until the filling is set.

After the pie has cooled, fill the shells with cranberry, lemon, cherry or any other fruit filling.

Formula from Research Bakery, Armour and Co.

FORMULA NO. 503

Soya Form Cake

Soya Sweet dough	12 lb.
Sugar	12 oz.
Yolks or whole eggs	12 oz.
Butter	12 oz.
Low-fat soya flour	10 oz.
Nutmeats (optional)	8 oz.
Fruit mixture (variable)	2 lb.

Directions

Place the fermented sweet dough in a mixing bowl, add the other ingredients and mix to a soft smooth dough.

If the fermented dough is taken at the first punch, allow the mix to rest 20 to 30 minutes, then scale into the desired unit. If the dough is fully fermented, deposit at once in pans. Give three-fourths to full proof with little steam.

Bake at 365 to 380 deg. F.

Enzyme-converted corn sirup, 1 lb. 4 oz., may be substituted for the sugar. This is a suggested formula, and should be carefully tested under the manufacturing conditions that are found in each plant.

Formula from A. E. Staley Mfg. Co.

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